

CHAPTER 12

CORRECTIVE MAINTENANCE

Section I. GENERAL

12-1. Scope

This chapter contains specific procedures for the replacement of authorized parts in the missile guidance set, forward body section, warhead body section, missile motor section, equipment section, actuator section, main fins and

elevons, rocket motor cluster, and the shipping and storage containers.

WARNING: Before performing corrective maintenance of the missile body, the rocket motor cluster, or their components, the steps necessary for deenergizing or disarming must be performed as prescribed in table 12-1.

Table 12-1. Deactivation Procedures That Must Be Performed Before Corrective Maintenance Operations

| Component being replaced | Designated area for corrective maintenance: A | Inspect safety-&arming devices for safe condition: X | Inspect rocket motor igniter cable for proper shorting (fig. 10-10). X | Place connectors P1X & P72A in the dummy connectors on launching-handling rail (fig. 9-19). X | Remove the safety-&arming devices (par. 11-4a through e). X | Disconnect missile batteries (par. 11-5 or 11-6). X | Install nose hinge assembly (par. 12-5a). — | Remove propulsion arming lanyard (par. 11-40 through q). X | Remove missile body from launching- handling rail (chapter 11, section IV). X | Remove rocket motor cluster from launching-handling rail (chapter 11, section V). — | Remove igniters (par. 11-4s through v). X |
|---|--|--|--|--|---|---|---|--|---|--|---|
| Missile body and rocket motor cluster components (less guidance): actuator section access door assemblies | A | X | X | X | X | X | — | X | X | — | X |
| APS | A | X | X | X | X | — | — | — | — | — | — |
| APS with HPU's | A | X | X | X | X | — | — | — | — | — | — |
| Batteries BA-472/U and BA-472A/U | A ⁶ | X | X | X | X | — | — | — | — | — | — |
| Elevons | A ⁶ | X | X | X | — | — | — | — | — | — | — |
| Elevon locks | A ⁶ | X | X | X | — | — | — | — | — | — | — |
| Equipment section access cover plates | A ⁶ | X | X | X | — | — | — | — | — | — | — |
| Fail-safe insulation blanket and/or bracket | A ⁶ | X | X | X | X | X | X | X | X | — | — |

See footnotes at end of table.

Table 12-1. Deactivation Procedures That Must Be Performed
Before Corrective Maintenance Operations—Continued

| Component being replaced | Designated area for corrective maintenance. ¹ | Inspect safety-&arming devices for safe condition. ² | Inspect rocket motor igniter cable for proper shorting (fig. 10-10). | Place connectors P1X & P72A in the dummy connector on launching-handling rail (fig. 9-19). ³ | Remove the safety-&arming devices (par. 11-4a through e). | Disconnect missile batteries (par. 11-5 or 11-6). ⁴ | Install nose hinge assembly (par. 12-6a). | Remove propulsion arming lanyard (par. 11-40 through q). | Remove missile body from launching-handling rail (chapter 11, section IV). | Remove rocket motor cluster from launching-handling rail (chapter 11, section V). | Remove igniters (par. 11-4s through vi). |
|---|--|---|--|---|---|--|---|--|--|---|--|
| Fairing wedges (top and bottom) | B | X | X | X | X | X | X | X | X | X | X |
| Fairing wedges (sides) | A ⁵ | X | X | X | X | X | X | X | X | X | X |
| Filler blocks | B | X | X | X | X | X | X | X | X | X | X |
| Fin fitting assembly | B | X | X | X | X | X | X | X | X | X | X |
| Forward body section | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward body section access doors | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward body section boltwell covers | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward fin assemblies | A | X | X | X | X | X | X | X | X | X | X |
| Switch, S31 test | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward main fins | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward nozzle fairings | B | X | X | X | X | X | X | X | X | X | X |
| Forward retaining rail bars | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Forward slipper | B | X | X | X | X | X | X | X | X | X | X |
| HPU | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| HPU squib battery | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Igniters | A | X | X | X | X | X | X | X | X | X | X |
| Index pin | A | X | X | X | X | X | X | X | X | X | X |
| Missile battery box and components | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Missile warhead fin brackets | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Missile motor head heater | B | X | X | X | X | X | X | X | X | X | X |
| Missile motor section access doors | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Missile rocket motor subassembly | B | X | X | X | X | X | X | X | X | X | X |
| Nose tip | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Propulsion arming | B ⁶ | X | X | X | X | X | X | X | X | X | X |
| Nozzle fairings lanyard | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Ram-pressure probes 8529625 (missiles 10206 through 11935) | A ⁶ | X | X | X | X | X | X | X | X | X | X |
| Ram-pressure probes 9025404 (missiles 13001 and subsequent) | A ⁶ | X | X | X | X | X | X | X | X | X | X |

See footnotes at end of table.

Table 12-1. Deactivation Procedures That Must Be Performed
Before Corrective Maintenance Operations—Continued

| Component being replaced | Designated area for corrective maintenance: A ⁶ | Designated area for corrective maintenance: A ⁶ | Designated area for corrective maintenance: A ⁶ | Inspect safety-&-arming devices for safe condition. ² | Inspect rocket motor ignitor cable for proper shorting (fig. 10-10). ³ | Place connectors P1X & P72A in the dummy connector on launching-handling rail (fig. 9-19). ³ | Remove the safety-&-arming devices (par. 11-4a through e.). ⁴ | Disconnect missile batteries (par. 11-5 or 11-6). ⁴ | Install nose hinge assembly (par. 12-5a). | Remove propulsion arming lanyard (par. 11-4d through q). ⁴ | Remove missile body from launching-handling rail (chapter 11, section IV). | Remove rocket motor cluster from launching-handling rail (chapter 11, section VI). | Remove ignitors (par. 11-4s through v). | |
|--|---|---|---|--|---|---|--|--|---|---|--|--|---|---|
| Rear main fins | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rear retaining rail bars | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rocket motor cluster fin assemblies | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rocket motor ignitor cable assembly | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rocket motor thrust ring assembly | B | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rocket motor M42 | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Rocket motors M5E1 | B | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Safety-and-arming device-clip bracket | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Special shape insulation | B | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Stagnation tube assembly 8529069 (missiles 10206 through 11935) | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Stagnation tube assembly 9034674 (missiles 13001 and subsequent) | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Thermal battery assembly 9031082 | A,B ⁷ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Ventilator assembly | A ⁸ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Warhead body section access cover plates | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Warhead body section boltwell covers (station 150) | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Warhead body section boltwell covers (station 136) | A ⁶ | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Missile guidance set components ⁶ (Stovepipe): | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Amplifier Decoder | | | | | | | | | | | | | | |
| Antenna horn | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Delay line drive detector | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Fail-safe control | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Magnetron electron tube ⁹ | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Missile-code delay line | A | X | X | X | X | X | X | X | X | X | X | X | X | X |
| P steering amplifier | A | X | X | X | X | X | X | X | X | X | X | X | X | X |

See footnotes at end of table.

Table 12-1. Deactivation Procedures That Must Be Performed Before Corrective Maintenance Operations—Continued

| Component being replaced | Designated area for corrective maintenance. ¹ | | Inspect safety-&arming devices for safe condition. ² | | Inspect rocket motor igniter cable for proper shorting (fig. 10-10). | | Place connectors P1X & P72A in the dummy connector on launching-handling rail (fig. 9-19). ³ | | Remove the safety-&arming devices (par. 11-4a through e). | | Disconnect missile batteries (par. 11-5 or 11-6). ⁴ | | Install nose hinge assembly (par. 12-5a). | | Remove propulsion arming lanyard (par. 11-4d through q). | | Remove missile body from launching-handling rail (chapter 11, section IV). | | Remove rocket motor cluster from launching-handling rail (chapter 11, section V). | | Remove igniters (par. 11-4a through v). | | |
|---|--|-----|---|-----|--|-----|---|-----|---|-----|--|-----|---|-----|--|-----|--|-----|---|-----|---|-----|---|
| Radar modulator | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | |
| Radar modulator thyatron electron tube | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Rectifying crystal unit | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Roll control amplifier | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Sequential timer | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Tapped delay line | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Transponder control group | A | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | X X | |
| Voltage regulator elec- tron tubes V1, V2, and V3 | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Waveguide assembly (2 types) | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Y steering amplifier | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Missile Guidance | | | | | | | | | | | | | | | | | | | | | | | |
| Set components (Mushroom): | | | | | | | | | | | | | | | | | | | | | | | |
| Antenna horn | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Fail-safe control | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Interconnecting board | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Magnetron electron tube ⁵ | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Missile-code delay line | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Preformed packing (transponder) | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Radio set components | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Sequential timer | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

See footnotes at end of table.

Table 12-1. Deactivation Procedures That Must Be Performed
Before Corrective Maintenance Operations – Continued

| Component being replaced | Designated area for corrective maintenance ¹ | | Inspect safety- ⁸ -arming devices for safe condition ² | | Inspect rocket motor igniter cable for proper shorting (fig. 10-10). ³ | | Place connectors P1X & P72A in the dummy connectors on launching-handling rail (fig. 9-19). ³ | | Remove the safety- ⁸ -arming devices (par. 11-4a through e). ⁴ | | Disconnect missile batteries (par. 11-5 or 11-6). ⁴ | | Install nose hinge assembly (par. 12-5a). | | Remove propulsion arming lanyard (par. 11-4d through q). ⁴ | | Remove missile body from launching-handling rail (chapter 11, section V). ⁵ | | Remove rocket motor cluster from launching-handling rail (chapter 11, section V). ⁵ | | Remove igniters (par. 11-4s through v). ⁵ | | |
|---|---|---|--|---|---|---|--|---|--|---|--|---|---|---|---|---|--|---|--|---|--|---|---|
| Transponder control group | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Transponder desiccant | A | X | X | X | — | — | — | X | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Waveguide assembly 9007629 | A | X | X | X | X | X | X | X | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Waveguide assembly 9007631 | A | X | X | X | X | X | X | X | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Waveguide assembly 9007632 | A | X | X | X | X | X | X | X | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Waveguide assembly 9009051 and 90095588 | A | X | X | X | X | X | X | X | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

¹Area in which the corrective maintenance operation may be performed:

A = Launching area.

B = Revetted area.

²A safe condition is indicated by a white area visible through the inspection window. A visible red area indicates an armed device. Missiles containing an armed device will be isolated and reported immediately to EOD support for disposition.

³CAUTION: Avoid grounding connectors P1X and P72A against the metal surfaces of equipment. Grounding will result in serious damage to the equipment.

⁴WARNING: In no case will missile umbilical cable connectors P104A and P105A be disconnected from the launching-handling rail before the missile battery is disconnected from the missile distribution box and connectors P1X and P72A have been placed in the launching-handling rail dummy connectors.

⁵DA MWO Y77-W30 must be applied to missiles 10206 through 11935 and 13001 through 13683 prior to replacing an APS unit with an HPU.

⁶Removal and replacement may be performed below ground. Maintenance and repair will not be accomplished below ground.

⁷WARNING: Actual removal of the batteries from the bracket must be performed in a revetted area.

⁸Disconnect connectors P162 and P163 from missile rocket motor initiators, and install shorting connectors.

⁹CAUTION: Nonferrous tools should be used in removing the magnetron electron tube to eliminate the magnetic attraction that impairs efficiency. Keep iron, steel, and magnets at least 2 inches from the magnetron electron tube.

12-2. Exterior Surface Skin Damage

a. Damage to the missile body skin is classified as listed below:

(1) *Dent.* A slight hollow in a surface, generally circular in shape and having a low point near the center of the circular area. The surface of the metal is not cut.

(2) *Scratch or gouge.* A surface skin damage in which the metal has been displaced to the sides of the scratch or gouge, resulting from striking or scraping of the skin surface with a sharp instrument.

(3) *Pit.* A small circular indentation in the surface, resulting from chemical action or corrosion.

(4) *Puncture.* A complete surface penetration, usually from a sharp object. Any puncture is cause for rejection.

b. Surface damage to the missile, rocket motor adapter, and blast tube liners will not necessarily be cause for rejection. However, if any of the conditions described in a(1) through a(3) above exist, have the defect inspected by the direct support (DS) unit to determine whether the missile is serviceable or must be rejected.

12-3. Safety Precautions Applicable to Corrective Maintenance Operations in the Launching Area and the Revetted Area

a. *General.* The missile contains explosives. All applicable safety precautions will be strictly enforced. Do not perform handling operations during electrical storms. Only a minimum of personnel will be permitted at or near the work location. The quantity of explosive material at any work location will be kept to an absolute minimum. Spilled explosive material will be removed immediately, and the area decontaminated thoroughly before work is resumed. Explosive components that contain electrical wiring must be protected at all times from stray voltages or induced currents. Extreme care will be exercised when handling explosive components when size or weight makes handling difficult.

b. *Safety Precautions Applicable to Launching Area Corrective Maintenance Procedures.*

NOTE. Preparation will be accomplished by organizational personnel. This work will be supervised by qualified explosives trained personnel. The number of personnel to prepare a missile for maintenance will be held to the minimum consistent with safe and efficient operation.

WARNING: The missile on which corrective maintenance is to be performed shall be located as follows:

(1) **CONUS TYPE INSTALLATIONS.**

Above-ground on any launcher, except the elevator-mounted launcher, except for those operations that are authorized to be performed below ground. (See table 12-1).

(2) **USARAL-AND USAREUR-TYPE INSTALLATIONS.** On the launching pad, except for those operations that are authorized to be performed within the storage building.

(3) **USARHAW-TYPE INSTALLATIONS.**

In the barricaded (revetted) launching area, separated by the maximum distance possible from other missiles and explosives.

(4) **MOBILE-TYPE INSTALLATIONS.**

There is no barricaded (revetted) launching area. The degree of organizational maintenance and the area in which these operations will be accomplished will be determined by the officer in charge.

WARNING: All missiles or components containing explosives other than those prepared for corrective maintenance will be stored as follows:

(1) **CONUS-TYPE INSTALLATION.** Missiles or components will be stored in the underground casemate.

(2) **USARAL- AND USAREUR-TYPE INSTALLATIONS.** Missiles or explosive components will be stored within the storage building and the doors will be closed.

(3) **USARHAW-TYPE INSTALLATIONS.** Missiles or explosive components will be separated the maximum distance possible from the missile or component on which corrective maintenance is being performed.

(4) **MOBILE-TYPE INSTALLATIONS.** Missiles and explosive components other than the normal launcher complement will not be stored in the launching area. Missiles on standby will be separated the maximum distance possible from the launcher.

WARNING: The following safety precautions will be observed in the launching area during the preparation of the missile or component for corrective maintenance:

(1) Fire-, flame-, or spark producing devices will not be permitted in the area when work is being accomplished on a guided missile or a component containing explosives or hazardous material.

(2) Limit the number of personnel in the area to the number consistent with safe and efficient operation.

(3) Only one missile will be permitted in the revetted area. No concurrent operations will be permitted during corrective maintenance operations.

(4) The location where corrective maintenance is being performed upon a missile will be separated from underground magazines, explosive-component storage locations, and other facilities within the launching area by a distance of not less than 95 feet, if the location is barricaded, or 480 feet, if not barricaded (TM 9-1300-206).

(5) The location will be separated from public highways and public railways by a distance of not less than 240 feet, if the location is barricaded, or 480 feet, if not barricaded.

(6) The location will be separated from inhabited buildings, including barracks, mess halls, and headquarters buildings, by a distance of not less than 400 feet, if the location is barricaded, or 800 feet, if not barricaded.

Section II. CORRECTIVE MAINTENANCE OF THE MISSILE GUIDANCE SET (MUSHROOM)

12-4. General

This section contains instructions for the performance of authorized corrective maintenance of the mushroom missile guidance set. Corrective maintenance consists of the replacement of parts listed in TM 9-1410-250-15P/1/1 and related cleaning and inspection functions.

12-5. Installation and Removal of the Nose Hinge Assembly

a. Installation.

(1) Remove the flat-head screws (1, fig. 12-1): four from the right side of the forward body section (16) and four from the right side of the warhead body section (17).

(2) Remove the six boltwell covers (3).

CAUTION: Care must be exercised to prevent damage to threads when performing the steps below.

(3) Remove the hexagon-head bolt and flat washer (4 and 5) from the boltwell located between forward fin assemblies No.'s 2 and 3 (12 and 13).

Note. When performing step (4) below, install all of the captive bolts, finger-tight, before torquing any of them.

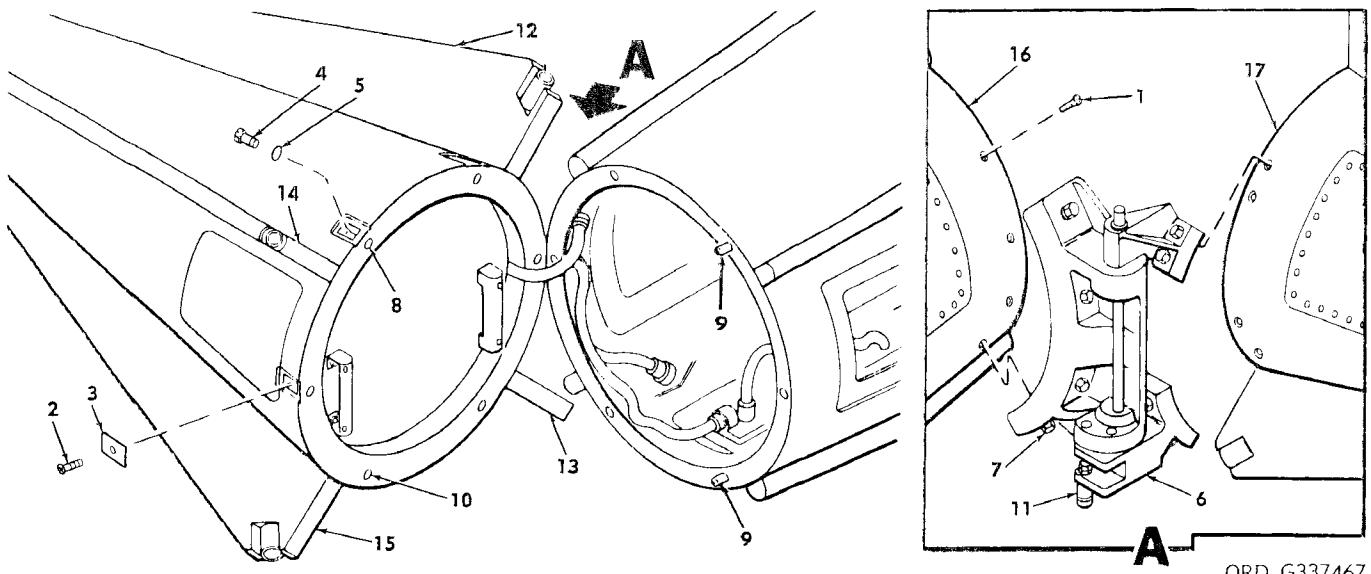
(4) Attach the nose hinge assembly (6) to the right side of the missile with the captive bolts (7); torque the bolts to the value given in table 15-9.

(5) Remove the hexagon-head bolt and flat washer from the boltwell mounting hole (8) located between forward fin assembly No. 1 (14) and forward fin assembly No. 2.

Note. The guide pins installed in steps (6) and (7) below are stored in two of the tapped holes in the flange of the nose hinge assembly until ready for use.

(6) Install a guide pin (9) through the boltwell mounting hole (8) and secure in the threaded body section attach hole in the warhead body section.

(7) Repeat steps (5) and (6) above for the boltwell mounting hole (10) located between forward fin assembly No. 3 (13) and forward fin assembly No. 4 (15).



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- 1—1/4-28 x 27/32 fl-hd screw (8)
- 2—No. 10-32 x 1-11/32 fl-hd screw (6)
- 3—Boltwell cover (6)
- 4—5/16-24 x 27/32 hex-hd bolt (6)
- 5—0.328-in-id fl washer (6)
- 6—Nose hinge assy
- 7—Captive bolt (8) (p/o nose hinge assy)
- 8—Boltwell mounting hole
- 9—Guide pin (p/o nose hinge assy)

- 10—Boltwell mounting hole
- 11—Locking pin (p/o nose hinge assy)
- 12—Forward fin assy No. 2
- 13—Forward fin assy No. 3
- 14—Forward fin assy No. 4
- 15—Forward fin assy No. 1
- 16—Forward body section
- 17—Warhead body section

Figure 12-1. Removal and installation of the nose hinge assembly.

(8) Remove the hexagon-head bolts and flat washers from the remaining boltwell mounting holes in the forward body section.

Caution: Exercise care to prevent damage to cable assemblies when opening the forward body section.

(9) Swing the forward body section to the right until the nose hinge assembly locks.

b. Removal.

Caution: Exercise care in returning the nose section to the mating position to prevent damage to the cable assemblies.

(1) Release the locking pin (11, fig. 12-1) if required.

(2) Swing the forward body section (16) carefully into fully closed position so that the guide pins (9) in the warhead body section (17) align with and enter the boltwell mounting holes (8 and 10) in the forward body section.

(3) Install the hexagon-head bolts (4) and flat washers (5) in the open boltwell mounting holes in the top, bottom, and left side of the missile. Secure firmly but do not torque.

(4) Remove the guide pin from the boltwell mounting hole (8) and install a hexagon-head bolt and flat washer. Secure the bolt firmly but do not torque.

(5) Repeat step (4) above for the guide pin installed in the boltwell mounting hole (10).

Note. Stow the guide pins removed in steps (4) and (5) above in two of the tapped holes in the flange of the nose hinge assembly.

CAUTION: To prevent damage to the threads, support the nose hinge assembly during removal.

(6) Remove the nose hinge assembly (6) and install the remaining hexagon-head bolt and flat washer in the boltwell mounting hole on the right side of the missile.

(7) Install the flat-head screws (1) in the nose hinge assembly mounting holes. Torque the screws to 23 pound-inches.

(8) Following the sequence shown in figure 7-10 loosen one at a time and torque the hexagon-head bolts installed in steps (3) through (6) above to the value given in table 15-9.

(9) Install the six boltwell covers (3, fig. 12-1) and secure with the flat-head screws (2). Torque the screws to the value given in table 15-9.

12-6. Handling, Cleaning, and Inspection

a. General. To insure proper operation of the missile guidance set, it is necessary to enforce rigidly controlled procedures whenever the transponder-control group is opened for the performance of corrective maintenance. Maintenance personnel must be certain that all parts are mechanically secure because of the high acceleration that the guidance set must withstand during missile flight. Exercise care to prevent the entry of dust or dirt into the transponder-control group. The recommended procedures for handling, cleaning, and inspecting the missile guidance set and its parts are outlined in b through f below.

CAUTION: Be certain that all items such as bolts, screws, and washers that may have fallen into the transponder-control group during replacement procedures have been removed, as failure to remove these may seriously affect missile functioning.

b. Handling Disassembled Parts.

(1) Provide a parts tray or some other suitable container for the storage of small parts as they are removed. Keep large parts on a work bench or in some other safe place where they will not be damaged. In disassembly, keep the disassembled parts in logical order.

WARNING: When using trichlorethane or mineral spirits be sure that the area is well-ventilated, as the fumes are toxic and the mineral spirits flammable.

(2) When the parts are to remain disassembled over a long period of time, clean the bare metal surfaces with trichloroethane. Wipe the parts completely dry. Before assem-

bling parts, clean them with trichloroethane, and apply permanent lubrication as required.

(3) The rectifying crystal units are sensitive to voltage differences and can be damaged by stray voltage. They can safely carry only minute currents. When dissimilar metals are joined, or when maintenance personnel touch a rectifying crystal unit, voltages may be applied that could damage the unit. Maintenance personnel should avoid touching both ends of a rectifying crystal at the same time. If this is impracticable, the organizational maintenance technician should first ground himself to release any static charges and then handle the crystal unit, using only the fingers of one hand.

c. Hazards of Magnesium.

(1) *Fire.* Magnesium and its alloys are used extensively in the missile guidance set. As magnesium is flammable, buckets of dry sand should be placed throughout the maintenance building to smother small fires. Larger containers of dry sand should be kept nearby to smother larger magnesium fires.

Caution: Do not use water, any common liquid, or foam-type extinguisher on magnesium fires, as these only intensify the fire. Use only dry sand.

(2) *Corrosion.* Magnesium is highly susceptible to corrosion, especially in salty atmospheres. Keep the parts as clean and dry as possible.

d. Cleaning. After the removal of an assembly or part, clean it thoroughly to remove all corrosion, dust, grit, grease, mold, fungi, and other foreign substances according to the procedures prescribed in (1) and (2) below.

Warning: Wear goggles during cleaning operations involving the use of compressed air or chemical solvents.

(1) Remove the loose dirt and grit with compressed air or a dry, lint-free brush. When compressed air is used, maintain the pressure between 15 and 18 psi. Using a small air hose, direct the air stream from a distance sufficient to prevent damage to the equipment.

Warning: As chemicals used in the cleaning processes are harmful to personnel, always wear protective clothing and goggles when using these chemicals. Avoid skin contact with solvents and inhalation of their fumes and vapors. Use trichloroethane or other toxic chemicals out of doors, under a ventilation hood, or in a well-ventilated area.

Caution: Do not allow cleaning chemicals to contact rubber compound parts or electrical insulation, as the chemicals may cause them to deteriorate.

(2) Clean the metal surfaces with trichloroethane. Wash rubber compound parts with soap and water, and dry thoroughly. Wipe the electrical wiring insulation clean with a cloth moistened with denatured alcohol.

(3) Surfaces covered with damaged paint should be painted.

e. *Inspection.* Reject assemblies, or any parts of an assembly, that do not meet the standards prescribed in (1) through (3) below.

(1) *Hardware.*

(a) The screw slots are undamaged.

(b) The clamps are not twisted or crooked.

(2) *Cabling.*

Caution: When checking the cabling or wiring harnesses attached to the connectors, use finger pressure to avoid breaking the connections.

(a) The cabling or wiring harness is neither pulled too taut nor left too slack.

(b) The lacing or taping is not defective. Check particularly at breakout points and bends for burns, loose lacing and taping, and for damage to the insulation. Check to ascertain that the nylon lacing tape is tight and properly positioned inside the clamps or brackets that secure the cable.

(c) The clamps, brackets, and straps are secure.

(3) *Connectors.*

(a) The type and position are correct.

(b) The mounting is secure, correct, and properly oriented.

(c) There is no contamination by fungus or corrosion.

(d) The connectors are secure on the cables.

(e) The connectors are properly mated and locked.

(f) The insulation is not chipped, cracked or broken.

(g) The cases are undamaged.

12-7. Replacement of the Antenna Horn

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Loosen the two captive screws (26, fig. 12-2) that secure the antenna horn (25) to the forward fin assembly (28). Remove the antenna horn.

b. Installation.

CAUTION: Do not apply more than 15 pound-inches of torque to the antenna horn captive screws.

(1) Ascertain that preformed packing (13, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

(2) Check the retaining rings (27) for damage. Replace them if necessary.

(3) Position the antenna horn on the forward fin assembly, and secure it with the two captive screws. Tighten the captive screws to the torque value given in table 15-9.

12-8. Replacement of the Fail-Safe Control

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the fail-safe control (par. 11-17).

b. Installation.

(1) Check the fastener retainer (22, fig. 12-2) for damage. Replace if necessary.

(2) Install the fail-safe control (par. 7-3).

c. *Rearming the missile.* Rarm the missile as instructed in chapter 10.

12-9. Replacement of Sequential Timer

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Disconnect connector P511 (7, fig. 7-6) from TIMER connector J1 (8) or JUMPER connector J2 (9) on the sequential timer (10).

(3) Remove the four flathead screws (4, fig. 7-4) that secure the sequential timer (5) to the inside of the warhead body section. Remove the timer.

b. Installation.

(1) Position the sequential timer (5) in the warhead body section, and secure it with the four flathead screws (4). Apply 25 pound-inches of torque to the screw.

Note. The connector on the timer that is used in (2) below should be in the forward position.

(2) Connect the fail-safe wiring harness connector P511 (7, fig. 7-6) to the TIMER connector J1 (8) or the JUMPER connector J2 (9) on the sequential timer (10).

c. Rearming the missile. Rerarm the missile as instructed in chapter 10.

12-10. Removal and Installation of the Rear Housing Cover

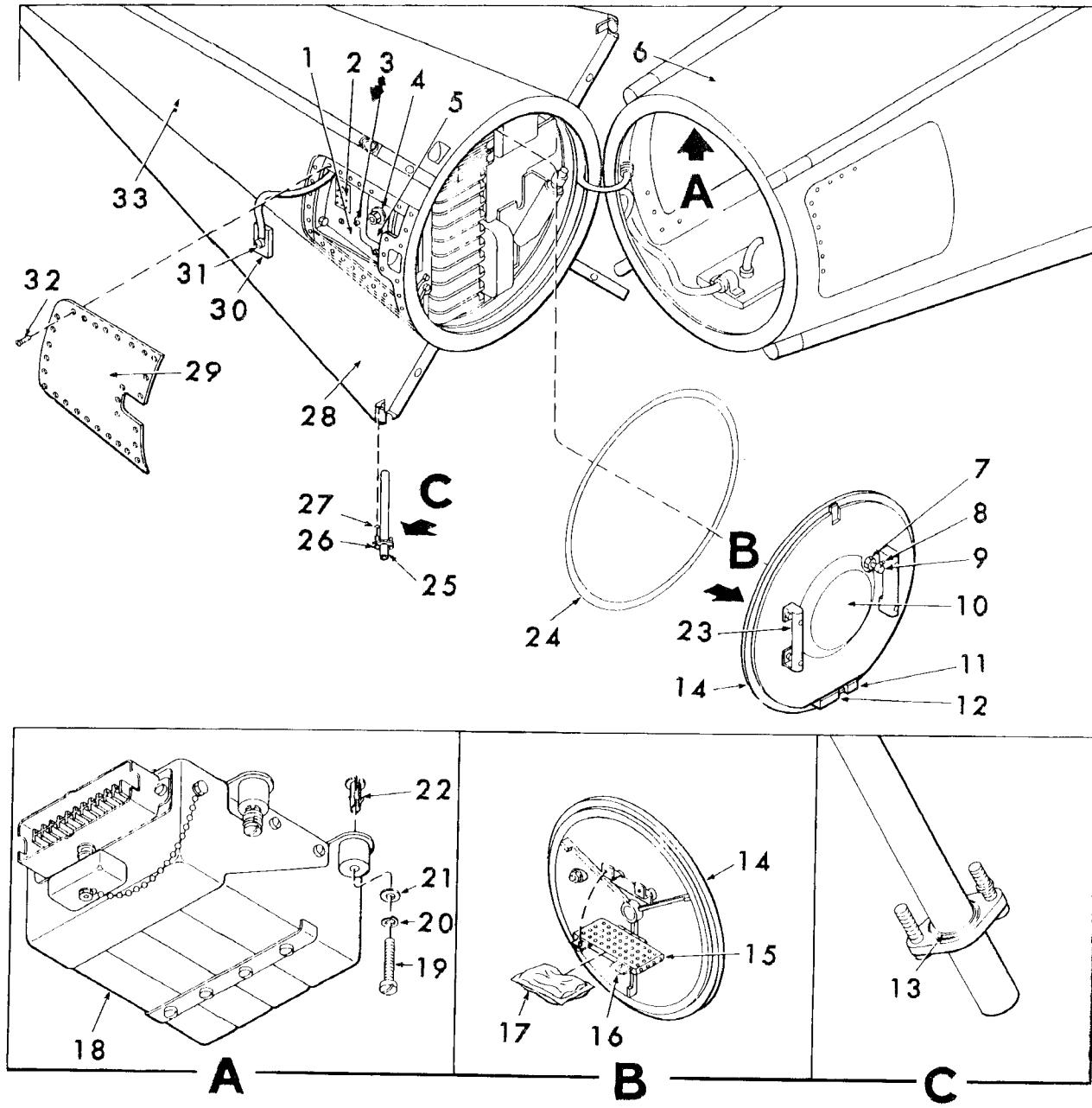
a. Removal.

Note. Replacement procedures referencing this paragraph require that the missile be prepared in accordance with the entry in table 12-1 covering the item being replaced.

(1) Prepare the missile as prescribed under the preformed packing entry in table 12-1.

WARNING: Extreme caution must be exercised when removing the forward and rear covers of the missile guidance set. A defective seal on the pressure relief valve can give a no-pressure indication when the valve stem is depressed, even though the guidance set is fully pressurized. Attempting to remove either the fore or aft cover under these circumstances could lead to serious injury or death.

(2) (Deleted)



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1—Transponder control group
 2—Connector J2
 3—Captive screw (6)
 4—Humidity indicator
 5—Access cover plate
 6—Warhead body section
 7—Pressure valve
 8—Air valve cap
 9—Plunger cap
 10—Rear housing cover
 11—Retaining screw
 12—Lever arm
 13—Performed packing
 14—Retaining ring
 15—Desiccant holder
 16—Captive screw (2)
 17—Activated desiccant
 18—Fail-safe control 9141841 or 9141836
 19—No. 10-32 x 1 fil-hd screw
 20—No. 10 lock washer
 21—No. 10 flat washer
 22—Fastener retainer
 23—Hook handle (2)
 24—Preformed packing

Figure 12-2. Forward body section and warhead body section.

25 — Antenna horn (4)
 26 — Captive screw
 27 — Retaining ring
 28 — Forward fin assembly
 29 — GUIDANCE TEST AND ADJUST
 ACCESS DOOR

30 — Connector P2
 31 — Captive screw
 32 — No. 10-32 x $2\frac{3}{32}$ fl-hd screw
 33 — Forward body section

Figure 12-2. Forward body section and warhead body section — Legend — Continued.

- (3) Remove the GUIDANCE TEST AND ADJUST ACCESS DOOR (29).
- (4) Loosen the six captive screws (3) that secure the access cover plate (5) to the transponder control group (1) sufficiently to ensure the depletion of the air pressure.
- (5) Loosen the retaining screw (11), and disengage the lever arm (12).
- (6) Exert a steady pull on the two hook handles (23), and remove the rear housing cover (10) from the transponder control group.

b. Replacement of Preformed Packing.

- (1) Remove the preformed packing (24) from the rear housing cover.
- (2) Clean the packing, packing seat, and metal sealing surfaces with a lint-free cloth saturated with toluene 6810-281-2002. Apply a thin coat of insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.
- (3) Install packing on housing cover.

c. Replacement of Activated Desiccant.

- (1) Loosen the two captive screws (16) that secure the desiccant holder (15) to the inside of the housing cover; hinge the desiccant holder back; and remove the desiccant (17) if deactivated.
- (2) Insert the desiccant into the desiccant holder, and secure the holder to the housing cover with the two captive screws.

d. Installation.

- (1) Check to ascertain the forward body section is fully open and that the hinge lock pin (12, fig. 3-29) snaps into the locked position.

- (2) With the pressure valve on the right, seat the housing cover on the transponder control group until the retaining ring (14, fig. 12-2) is flush with the rim of the housing.
- (3) Install the cover fully within the transponder control group housing, and press firmly on all sides of the housing cover and on each side of the lever arm to ensure proper seating.

Caution: Do not force the lever arm. The lever arm should close freely to three-eighths of an inch. If force is required to engage the lever arm, the rear housing cover is not seated properly.

- (4) Engage the lever arm, and tighten the retaining screw to secure the rear housing cover to the transponder control group.
- (5) Inspect the entire retaining ring for the proper seating.
- (6) Tighten the six captive screws that secure the access cover plate to the housing.
- (7) Perform the air leakage test on the transponder control group (para 4-15).
- (8) Check the humidity indicator (4, fig. 12-2) for the normal indication (blue); recheck the humidity indicator an hour later.
- (9) Position the GUIDANCE TEST AND ADJUST ACCESS DOOR on the forward body section (33), and secure it with the 28 flat-head screws.
- (10) Remove the nose hinge assembly (para 12-5b).
- (11) Rerarm the missile as instructed in chapter 10.

12-11. Replacement of the Missile-Code Delay Line

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the rear housing cover (para 12-10a).
- (3) Remove the missile-code delay line (5, fig. 12-3).

b. Installation.

- (1) Install the missile-code delay line.
- (2) Install the rear housing cover (para 12-10d).

12-12. Replacement of the Magnetron Electron Tube

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the rear housing cover (para 12-10a).

Caution: To prevent damage to the magnetron electron tube (11, fig. 12-3), use a nonferrous screwdriver to loosen the four captive screws in (4) below.

- (3) Remove the four screws (9) and four lockwashers (8) that secure the electron tube shield (7) to the radio transmitter (4).
- (4) Loosen the four captive screws (3) that secure the transmitter to the transponder control group.
- (5) Remove the two screws (10) and two lockwashers (12) that secure the transmitter to the heat exchanger (2); carefully remove the transmitter.
- (6) Disconnect the radio transmitter connector from the magnetron electron tube connector (fig. 12-4).

Caution: To minimize magnetic effects, keep iron, steel, or magnets at least 2 inches from the magnetron electron tube.

- (7) Remove the four screws and four lockwashers that secure the magnetron electron tube to the RF reflector isolator.

b. Installation.

Caution: To minimize magnetic effects, keep iron, steel, or magnets at least 2 inches from the magnetron electron tube.

- (1) Place the magnetron electron tube (fig. 12-4) in the mounting position, and secure it to the RF reflector isolator with the four screws and four lockwashers.
- (2) Connect the magnetron electron tube connector to the radio transmitter connector.
- (3) Clean the preformed packing on the ends of the waveguide assembly, packing seat, and metal sealing surface with a lint-free cloth saturated with cleaning solution 9156817. Apply lubricant insulating compound MIL-S-8660 to the packing seat, and metal sealing surface.
- (4) Carefully position the transmitter in the heat exchanger, and secure it to the exchanger with the two pan-head screws and two lock washers.

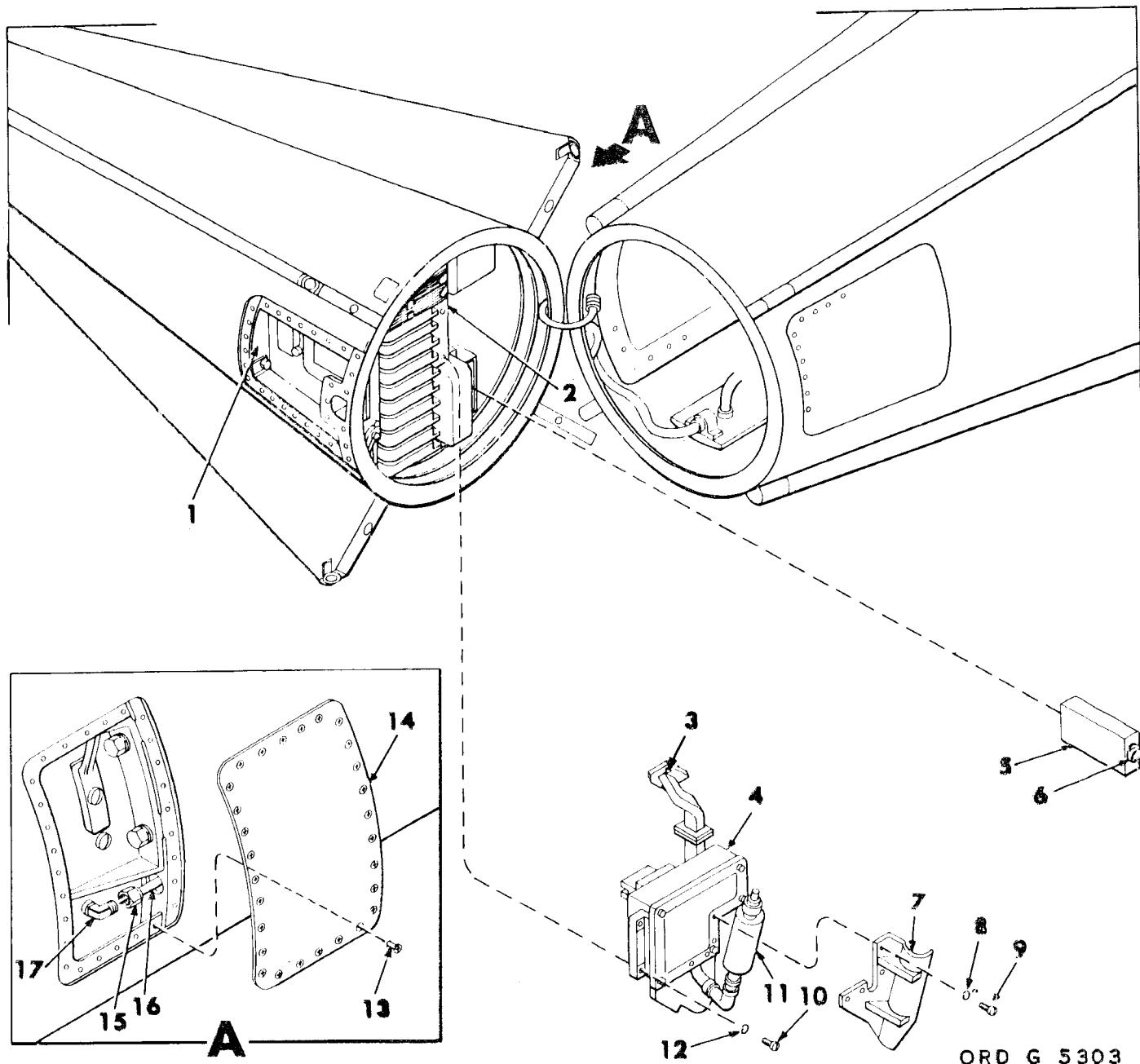
Caution: To prevent damage to the magnetron electron tube, a nonferrous screwdriver should be used to tighten the four captive screws in (5) below.

- (5) Secure the transmitter to the transponder control group with the four captive screws (fig. 12-4).
- (6) Place the electron tube shield in the mounting position, and secure it to the transmitter with the four pan-head screws and four lock washers.
- (7) Install the rear housing cover (para 12-10d).

12-13. Replacement of Transponder Control Group

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the access door assemblies (8 and 10, fig. 3-27).
- (3) Disconnect the transponder control group wiring harness connector P1 (19, fig. 3-31) from the transponder control group connector J1 (16).



- 1—Transponder control group
- 2—Heat exchanger
- 3—Captive screw (4)
- 4—Radio transmitter
- 5—Missile-code delay line
- 6—Knob
- 7—Electron tube shield
- 8—No. 6 lockwasher (4)
- 9—No. 6-32 x 5/16 pan-hd screw (4)

- 10—No. 10-24 x 3/4 pan-hd screw (2)
- 11—Magnetron electron tube
- 12—No. 10 lockwasher
- 13—No. 10-32 x 25/32 fl-hd screw (24)
- 14—J1 + XMTR access door
- 15—Stagnation tube fitting
- 16—Stagnation pressure tube
- 17—Elbow

Figure 12-3. Partially exploded view of the forward body section.

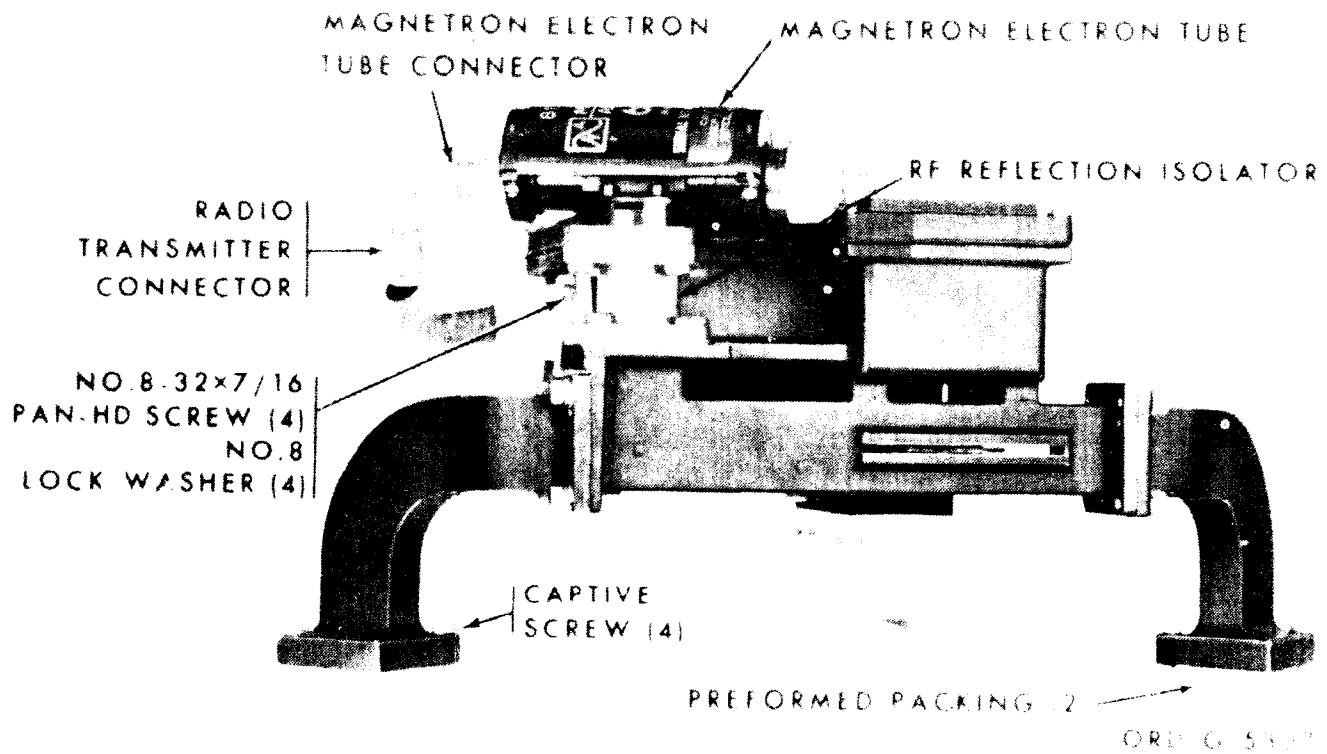


Figure 12-4. Radio transmitter with electron-tube shield removed.

(4) Install the protective cover assembly (17) on the transponder control group connector J1.

(5) Remove the flathead screw (1, fig. 7-9) that secures the support bracket (2) to the missile skin.

(6) Remove the transponder control group wiring harness (10) from the forward body section.

(7) Disconnect the stagnation pressure tube (16, fig. 12-3) from the elbow (17).

(8) Install the protective cap on the elbow and the protective plug in the end of the stagnation pressure tube. In the event the cap or the plug is not available, tape may be used.

(9) Open the cooling access door (7, fig. 4-3) located on the bottom of the missile. Remove the two springs (3) and the hose clamp (6).

(10) Loosen the four captive screws (4), and remove the hose assembly (5) and the spacer between the hose assembly and the missile guidance set.

(11) Remove the eight hexagon-head bolts (fig. 12-5), flat-washers, and lockwashers that secure the transponder control group inside the forward body section.

WARNING: The transponder control group weighs approximately 80 pounds. Provide adequate support during removal.

(12) Carefully remove the transponder control group from the forward body section.

b. Installation.

NOTE. Inspect the waveguide windows in the transponder control group housing for damage.

WARNING: The transponder control group weighs approximately 80 pounds. Provide adequate support during the installation.

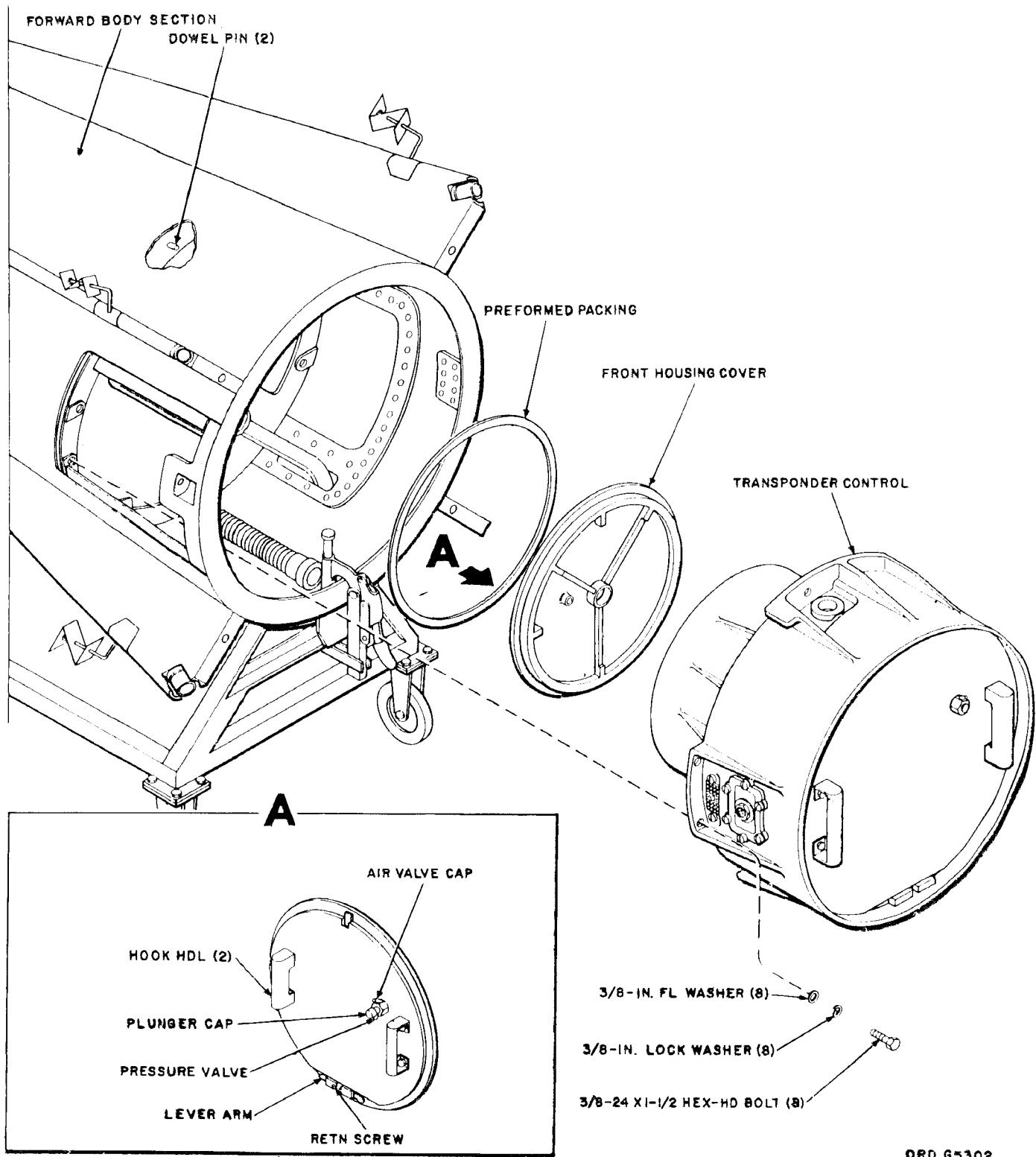


Figure 12-5. Partially exploded view of the forward body section and the transponder control group.

(1) Align the transponder control group with the two dowel pins inside the forward body section, and carefully install the group in the for-

ward body section.

(2) Secure the transponder control to the forward body section with the eight hexagon-head

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bolts, eight lock washers, and eight flat washers. Tighten the hexagon-head bolts to 175 pound-inches.

(3) Place the spacer and hose assembly in the mounting position, and secure it with the four captive screws.

(4) Install the hose clamp and two springs, and close the cooling access door.

(5) Remove the cap from the elbow, and remove the plug from the end of the stagnation pressure tube.

(6) Blow out the stagnation pressure tube from the elbow end with clean, dry, compressed air.

(7) Apply sealing compound MIL-S-7502 to the threads of the elbow and connect the stagnation pressure tube.

(8) Place the transponder control group wiring harness in the forward body section, and secure the support bracket to the missile skin with the flathead screw.

(9) Remove the protective cover assembly from the transponder control group connector J1.

(10) Connect the transponder control group wiring harness connector P1 to the transponder control group connector J1.

(11) Install the access door assemblies and tighten the screws to the torque value given in table 15-9.

(12) Remove the nose hinge assembly in accordance with paragraph 12-5b.

(13) Rerun the missile in accordance with chapter 10.

12-14. Replacement of Radio Set Components

a. Plug-In Components.

NOTE. The dc power filter (2, fig. 12-6), P steering amplifier (29), Y steering amplifier (28), roll control amplifier (25), sweep generator (24), pulse delay oscillator (21), P command signal converter (19), Y command signal converter (17), command signal decoder (18), P-Y burst delay network (16), command detonation electronic switch (15), delay line driver (13), RF detector (12), and amplifier bias control (27) are dimensionally identical. A typical removal and installation are prescribed in (1) and (2) below.

(1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Loosen the two captive screws, and remove the plug-in component.

(2) Installation.

(a) Insert the plug-in component into the heat exchanger, and secure it with the two captive screws.

(b) Install the housing cover (par. 12-10c and d).

b. Radio Transmitter.

(1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Remove the radio transmitter (pars. 12-12a (3) through (5)).

(2) Installation.

(a) Install the radio transmitter (par. 12-12b (4) through (6)).

(b) Install the housing cover (pars. 12-10c and d).

c. Transistor Oscillator Inverter.

(1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Loosen the four captive screws (8, fig. 12-6), and remove the transistor oscillator inverter (5).

(2) Installation.

(a) Position the oscillator inverter in the heat exchanger (14), and secure it with the four captive screws.

(b) Install the housing cover (par. 12-10c and d).

d. Radio Set Power Supply.

(1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Remove the transistor oscillator inverter (c above).

(c) Disconnect connectors P1 and J8 (4).

(d) Loosen the six captive screws (9), and remove the radio set power supply (3).

(2) Installation.

(a) Position the power supply in the heat exchanger (14), and secure it with the six captive screws (9).

(b) Connect the connectors P1 and J8; rotate the locking tab to secure the connectors.

(c) Install the transistor oscillator inverter (c above).

(d) Install the housing cover (par. 12-10c and d).

e. Amplifier-Decoder.

(1) *Removal.*

(a) Remove the rear housing cover (par. 12-10a).

(b) Disconnect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Loosen the four captive screws (8), and remove the amplifier-decoder (1).

(2) *Installation.*

(a) Position the amplifier-decoder in the heat exchanger (14), and secure it with the four captive screws (8).

(b) Connect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Install the housing cover (par. 12-10c and d).

f. Radio Receiver.

(1) *Removal.*

(a) Remove the rear housing cover (par. 12-10a).

(b) Disconnect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Loosen the captive screw (8), and remove the radio receiver (20).

(2) *Installation.*

(a) Position the receiver in the transponder control group housing (6), and secure it with the captive screw.

(b) Connect the connectors J1 and P1, and J2 and P2.

(c) Install the housing cover (par. 12-10c and d).

12-15. Replacement of the Preformed Packing from the Front Housing Cover

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder control group (par. 12-13a).

(3) Loosen the six captive screws (3, fig. 12-2) sufficiently to ensure the depletion of the air pressure from the guidance set, but do not remove the screws that secure the access cover plate (5).

(4) Loosen the retaining screw (fig. 12-5), and disengage the lever arm.

(5) Exert steady pull on the two hook handles, and remove the front housing cover from the transponder control group.

(6) Remove the preformed packing from the front housing cover.

b. Installation.

(1) Clean the packing, packing seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.

(2) Install the packing on the housing cover.

(3) Install the housing cover on the transponder control group, and press into position.

(4) Engage the lever arm, and tighten the retaining screw.

(5) Tighten the six captive screws (3, fig. 12-2) that secure the access cover (5) plate to the transponder control group (1).

(6) Install the transponder control group (par. 12-13b).

(7) Pressure test the transponder control group as prescribed in paragraph 4-15.

12-16. Replacement of the Flight Control Group

a. Removal.

(1) Remove the front housing cover (par. 12-15a (1) through (5)).

(2) Remove the metal hose assembly (3, fig. 12-7).

(3) Remove the cap screws (1), and remove the flight control group (24).

b. Installation.

(1) Install the flight control group.

(2) Install the metal hose assembly.

(3) Install the front housing cover (par. 12-15b (1) through (7)).

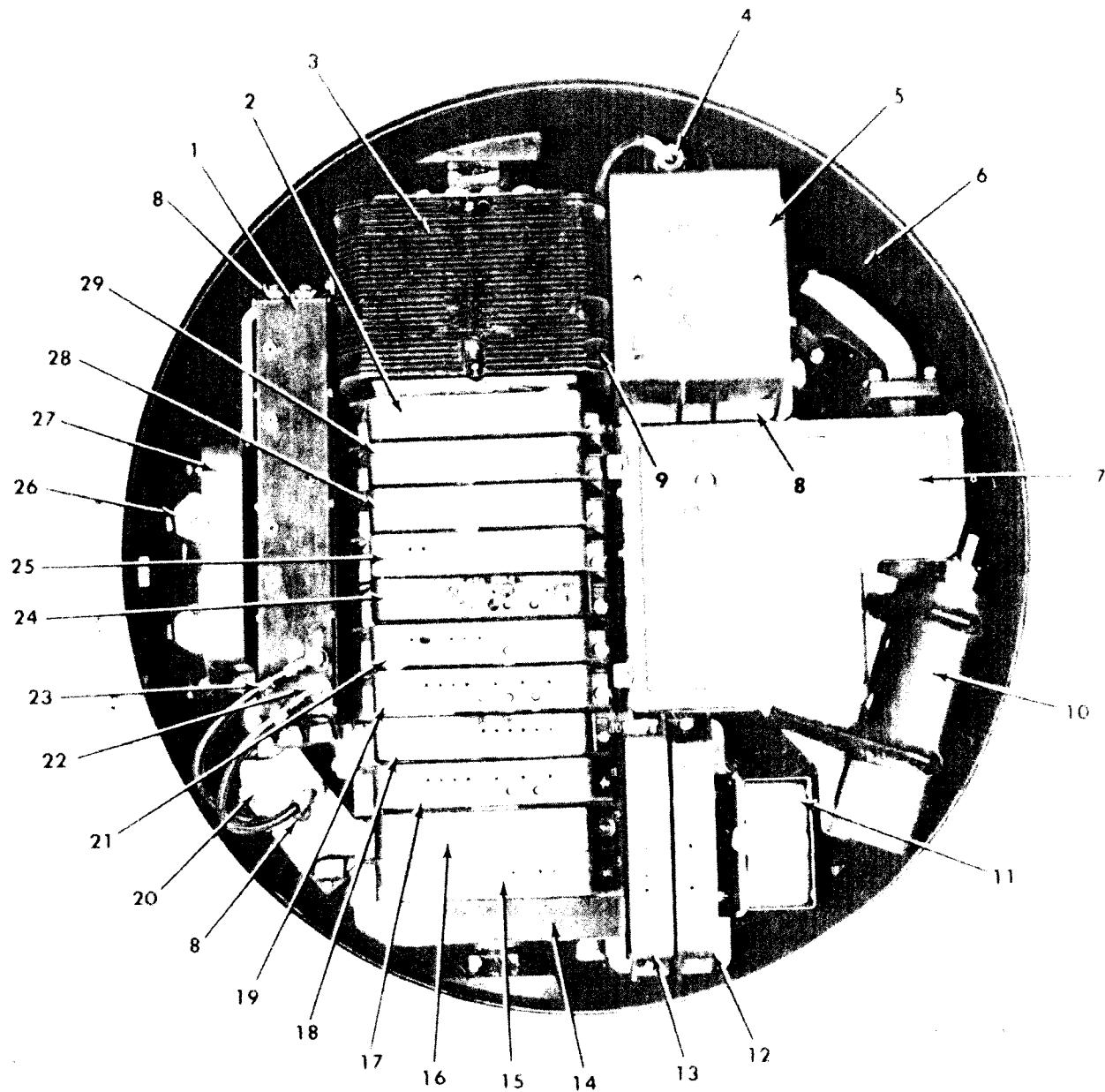
(4) (Deleted)

12-17. Replacement of the Interconnecting Board

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rear housing cover (par. 12-10a).



- 1—Amplifier-decoder A-17
- 2—Dc power filter A-3
- 3—Radio set power supply A-2
- 4—Connectors P1 and J8
- 5—Transistor oscillator inverter A-1
- 6—Transponder/control group housing
- 7—Radio transmitter A-18
- 8—Captive screw (4)
- 9—Captive screw (6)
- 10—Magnetron
- 11—Missile-code delay line
- 12—Radio frequency detector A-15
- 13—Delay line driver A-14
- 14—Heat exchanger
- 15—Command detonation electronic switch A-13
- 16—P-Y burst delay network A-12
- 17—Command signal converter (Y) A-11
- 18—Command signal decoder A-10
- 19—Command signal converter (P) A-9
- 20—Radio receiver A-19
- 21—Pulse delay oscillator A-8
- 22—Connectors P2 and J2

Figure 12-6. Interior view of the mushroom transponder-control group.

23—Connector P1 and J1
 24—Sweep generator A-7
 25—Roll control amplifier A-6
 26—Inertia switcher

27—Amplifier bias control A-16
 28—Y steering amplifier A-4, A-5
 29—P steering amplifier A-4, A-5

Figure 12-6—Continued.

- (3) Remove the missile-code delay line (par. 12-11a).
- (4) Remove each radio set plug-in component (par. 12-14a(1)).
- (5) Remove the radio transmitter (par. 12-14b(1)).
- (6) Remove the radio set power supply (par. 12-14d(1)).
- (7) Remove the amplifier-decoder (par. 12-4c(1)).
- (8) Remove the front housing cover (par. 12-15a(1) and (5)).
- (9) Remove the metal hose assembly (3, fig. 12-7).
- (10) Install the protective cap on the elbow (4) in the pressure transmitter (5).
- (11) Remove the capscrews (1) and lockwashers (2) that secure the flight control group (24) in the transponder control group housing (8); remove the flight control group.
- (12) Remove the screws (21), lockwashers (22), and flat washers (23) that secure the 2 screens (20) to the transponder control group; remove the 2 screens.
- (13) Remove the two tubes (19) from the transponder control group housing.
- (14) Remove the capscrews (6) and lockwashers (7) from the transponder control group housing.
- (15) Remove the screw (12), lockwasher (13), and flat washer (14) that secure the end of the bus bar (17) to the transponder control group housing.
- (16) Remove the capscrews (15) and lockwashers (7) that secure the heat exchanger (16) to the rear of the transponder control group housing. Remove the heat exchanger.
- (17) Remove the 13 panhead screws (11), lockwashers (10), and flat washers (9) that se-

cure the interconnecting board (18) to the transponder control group housing.

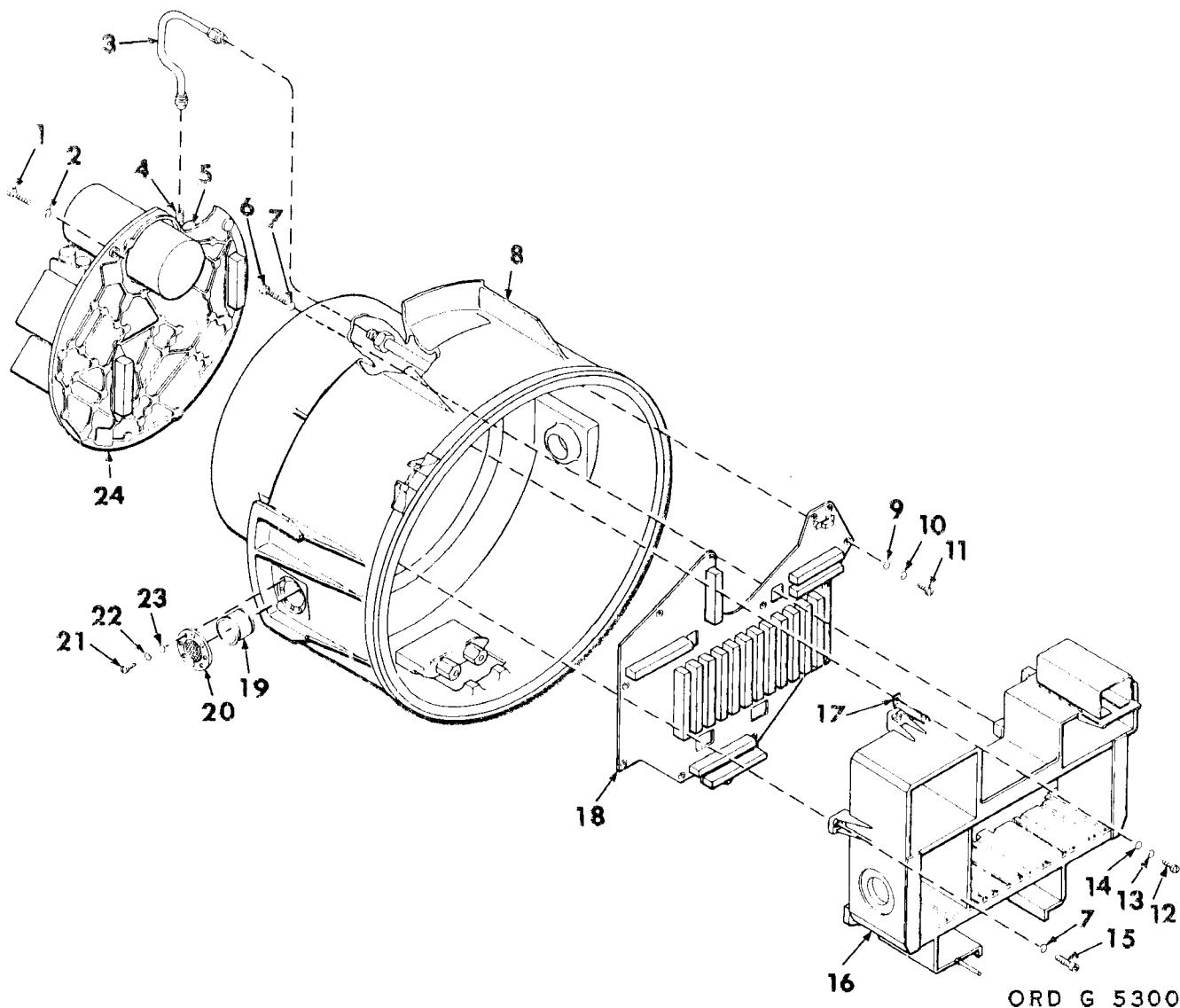
CAUTION: Exercise extreme care when removing the interconnecting board to prevent damage to the board and connectors.

- (18) Carefully remove the interconnecting board.

b. Installation.

CAUTION: Exercise extreme care when installing the interconnecting board to prevent damage to the board and connectors.

- (1) Carefully position the interconnecting board in the transponder control group housing.
- (2) Secure the interconnecting board to the housing with the screws (11), lockwashers (10), and flat washers (9).
- (3) Position the heat exchanger in the housing, and secure the heat exchanger to the rear of the housing with the capscrews (15) and lockwashers (7).
- (4) Secure the end of the bus bar (17) to the housing with the screw (12), lockwasher (13), and flat washer (14).
- (5) Install the capscrews (6) and lockwashers (7) in the transponder control group housing (8).
- (6) Clean the preformed packing on metal tubes, packing seat, and metal sealing surface with a lint-free cloth saturated with cleaning solution 9156817. Apply insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.
- (7) Insert the two tubes into the housing.
- (8) Apply antiseize compound to the threads of the screws (21).



- 1—1/4-20 x 1 1/8 socket-hd capscrew (9)
- 2—1/4-in. lockwasher
- 3—Metal hose assy
- 4—Elbow
- 5—Pressure transmitter
- 6—1/4-20 x 2-1/16 socket-hd capscrew (5)
- 7—1/4-in. lockwasher (12)
- 8—Transponder control group housing
- 9—No. 10 fl washer (13)
- 10—No. 10 lockwasher (13)
- 11—No. 10-24 x 5/8 pan-hd screw (13)
- 12—No. 8-32 x 5/16 pan-hd screw
- 13—No. 8 lockwasher
- 14—No. 8 fl washer
- 15—1/4-20 x 5/8 socket-hd capscrew (7)
- 16—Heat exchanger
- 17—Bus bar
- 18—Interconnecting board
- 19—Tube (2)
- 20—Screen (2)
- 21—No. 8-32 x 1/2 pan-hd screw (12)
- 22—No. 8 lockwasher (12)
- 23—Fl washer (12)
- 24—Flight control group

Figure 12-7. Partially exploded view of the mushroom transponder control group.

(9) Position the 2 screens on the housing, and secure them with the screws (21), lockwashers (22), and flat washers (23).

(10) Apply insulating compound MIL-I-8660 to the flight-control alignment pins.

(11) Carefully position the flight-control group in the transponder control group housing, and secure it with the cap screws (1) and lockwashers (2).

(12) Remove the cap from the elbow in the pressure transmitter.

(13) Install the metal hose assembly.

(14) Install the front housing cover (par. 12-15b (3) and (4)).

(15) Install the amplifier-decoder (par. 12-14e (2)).

(16) Install the radio set power supply (par. 12-14d (2)).

(17) Install the radio transmitter (par. 12-14b (2)).

(18) Install each radio set plug-in component (par. 12-14a (2) (a)).

(19) Install the missile-code delay line (par. 12-11b).

(20) Install the rear housing cover (par. 12-10d).

12-18. Replacement of Waveguide Assembly 9007629

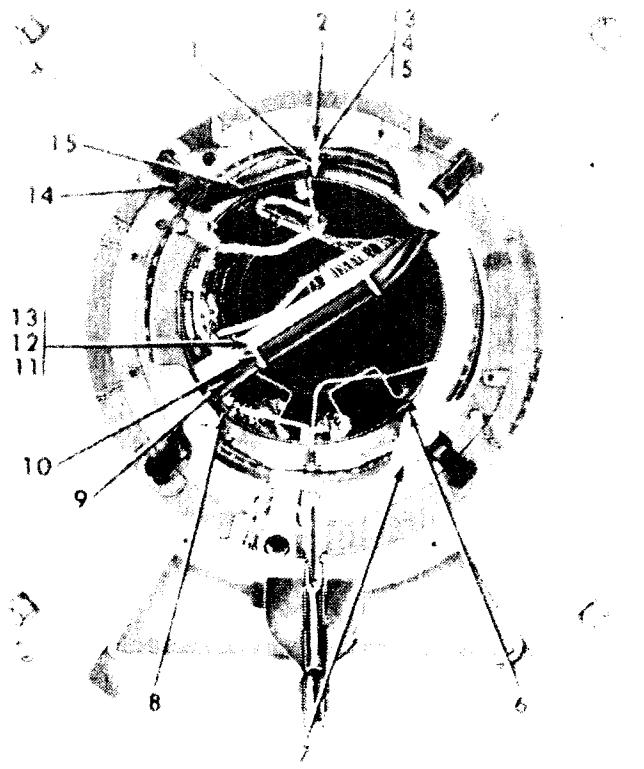
a. Removal.

(1) Remove the transponder control group from the forward body section (par. 12-13a).

(2) Remove the screws (11, fig. 12-8), flat washers (12), and sleeve spacers (13) that secure the two clamps to waveguide assembly 9007629.

(3) Remove the screws (fig. 12-9) and lockwashers that secure waveguide assembly 9007629 (fig. 12-8) to waveguide assembly 9007632.

(4) Remove the self-locking hexagon nuts (fig. 12-9), flat washers, springs, and shoulder screws that secure waveguide assembly 9007629 (9, fig. 12-8) to the frame. Remove the waveguide assembly.



- 1—Clamp
- 2—Bracket
- 3—No. 10-32 x 5/8 cross-recess truss-hd screw
- 4—No. 10 fl washer
- 5—No. 10 lockwasher
- 6—Waveguide assy 9009558
- 7—Frame
- 8—Waveguide assy 9009051
- 9—Waveguide assy 9007629
- 10—Clamp
- 11—No. 8-32 x 1-1/8 cross-recess id-hd screw
- 12—0.174-in id fl washer
- 13—Sleeve spacer
- 14—Waveguide assy 9007632
- 15—Waveguide assy 9007631

Figure 12-8. Interior view of the forward body section with the transponder control group removed.

(5) Spring open the two clamps, and remove them from the waveguide assembly.

b. Installation.

(1) Assemble the two clamps (10, fig. 12-8) to waveguide assembly 9007629.

(2) Position the end of the waveguide assembly on the frame, and secure it with the two shoulder screws (fig. 12-9), four flat washers, two springs, and two self-locking hexagon nuts.

(3) Secure waveguide assembly 9007631 (15, fig. 12-8) to waveguide assembly 9007632 (14) with the two panhead screws (fig. 12-9) and lockwashers.

(4) Assemble the cross-recess truss-head screw (3, fig. 12-8), flat washer (4) and lock-washer (5) to the clamp, and secure the clamp (10) to the bracket.

(5) Install the transponder control group (par. 12-13b).

12-19. Replacement of Waveguide Assemblies 9009051 and 9009558

NOTE. Replacement procedures for waveguide assemblies 9009051 (8, fig. 12-8) and 9009558 (6, fig. 12-8) are identical.

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder control group from the forward body section (par. 12-13a).

(3) Remove the screws (fig. 12-9) and lockwashers that secure waveguide assembly 9009051 (8, fig. 12-8) to waveguide assembly 9007632 (14).

(4) Remove the self-locking hexagon nuts (fig. 12-9), flat washers, springs, and shoulder screws that secure waveguide assembly 9009051 (8, fig. 12-8) to the frame. Remove the waveguide assembly.

b. Installation.

(1) Position waveguide assembly 9009051 on the frame, and secure it with the shoulder screws, springs, flat washers, and self-locking hexagon nuts.

(2) Secure waveguide assembly 9009051 (8) to waveguide assembly 9007632 (14) with the screws and lockwashers.

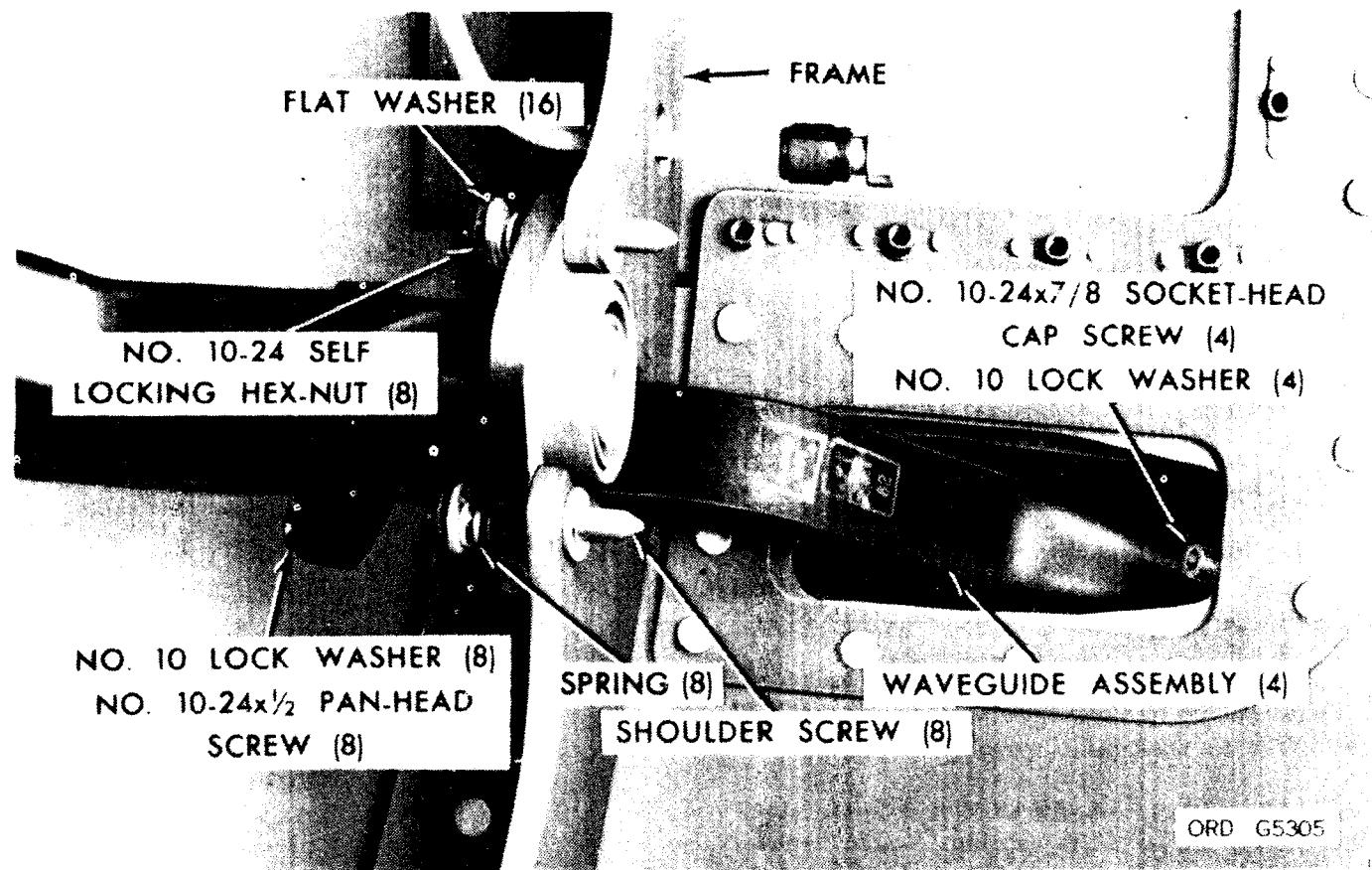


Figure 12-9. Partial interior view of the forward body section showing a typical waveguide assembly connection.

(3) Install the transponder control group (par. 12-13b).

12-20. Replacement of Waveguide Assembly 9007632

a. Removal.

(1) Prepare the transponder control group from the forward body section (par. 12-13a).

(3) Disconnect or remove the appropriate waveguide assembly as prescribed in paragraphs 12-18, 12-19, or 12-20.

(4) Remove the capscrew (fig. 12-9) and lockwasher that secure the waveguide assembly to the forward body section.

(5) Carefully remove the waveguide assembly.

b. Installation.

(1) Assemble the waveguide assembly to the interior of the forward body section, and

secure it in position with the cap screw and lockwasher.

(2) Replace the appropriate waveguide assembly as instructed in paragraphs 12-18, 12-19, or 12-20.

(3) Install the transponder control group (par. 12-13b).

12-21. Adjustment of the Missile Response Time

Adjust the DELAY LINE ADJUST switch on radio transmitter A18 to 850 ± 20 millimicroseconds. If the response time is shorter than the lower limit, rotate the DELAY LINE adjust switch in a clockwise direction. If the response time is longer than the higher limit, rotate the DELAY LINE ADJUST switch in a counterclockwise direction. Each step of the switch changes the delay by 20 millimicroseconds.

Section III. CORRECTIVE MAINTENANCE OF THE MISSILE

GUIDANCE SET (STOVEPIPE)

b. Installation.

(1) Ascertain that preformed packing (13, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

(2) Check the retaining rings (27) for damage, replace them if necessary.

(3) Position the antenna horn on the forward fin assembly and secure it with the two captive screws. Tighten the captive screws to the torque value given in table 15-9.

12-25. Replacement of the Fail-Safe Control

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the fail-safe control (par. 11-17).

Note. Check the fastener retainer (22, fig. 12-2) for damage. Replace if necessary.

b. Installation. Install the fail-safe control (par. 7-3).

c. Rearming the Missile. Rerarm the missile in accordance with Chapter 10.

12-21.1. General

This section contains instructions for the performance of authorized corrective maintenance of the stovepipe missile guidance set. The corrective maintenance consists of the replacement of parts listed in TM 9-1410-250-25P/2/1 and the related cleaning and inspection functions.

12-22. Installation and Removal of the Nose Hinge Assembly

a. Installation. Install the nose hinge assembly (par. 12-15a).

b. Removal. Remove the nose hinge assembly (par. 12-15b).

12-23. Handling, Cleaning, and Inspection

Refer to paragraph 12-6 for handling, cleaning, and inspection procedures.

12-24. Replacement of the Antenna Horn

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Loosen the captive screws (26, fig. 12-2) that secure the antenna horn (25) to the forward fin assembly (28), and remove the horn.

12-26. Replacement of the Sequential Timer

a. *Removal.* Remove the sequential timer (par. 12-9a).

b. *Installation.* Install the sequential timer (par 12-9b).

12-27. Replacement of the Rear Cover Gasket

a. *Removal.*

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

WARNING: Insure that the TCG is depressurized by depressing the valve core in the air valve (3, fig. 12-11) before removing the clamp.

(2) Loosen the clamp nut (fig. 12-10), and remove the cover.

(3) Remove the gasket (12, fig. 12-11) from the rear cover.

b. *Installation.*

(1) Clean the gasket, gasket seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002. Apply insulating com-

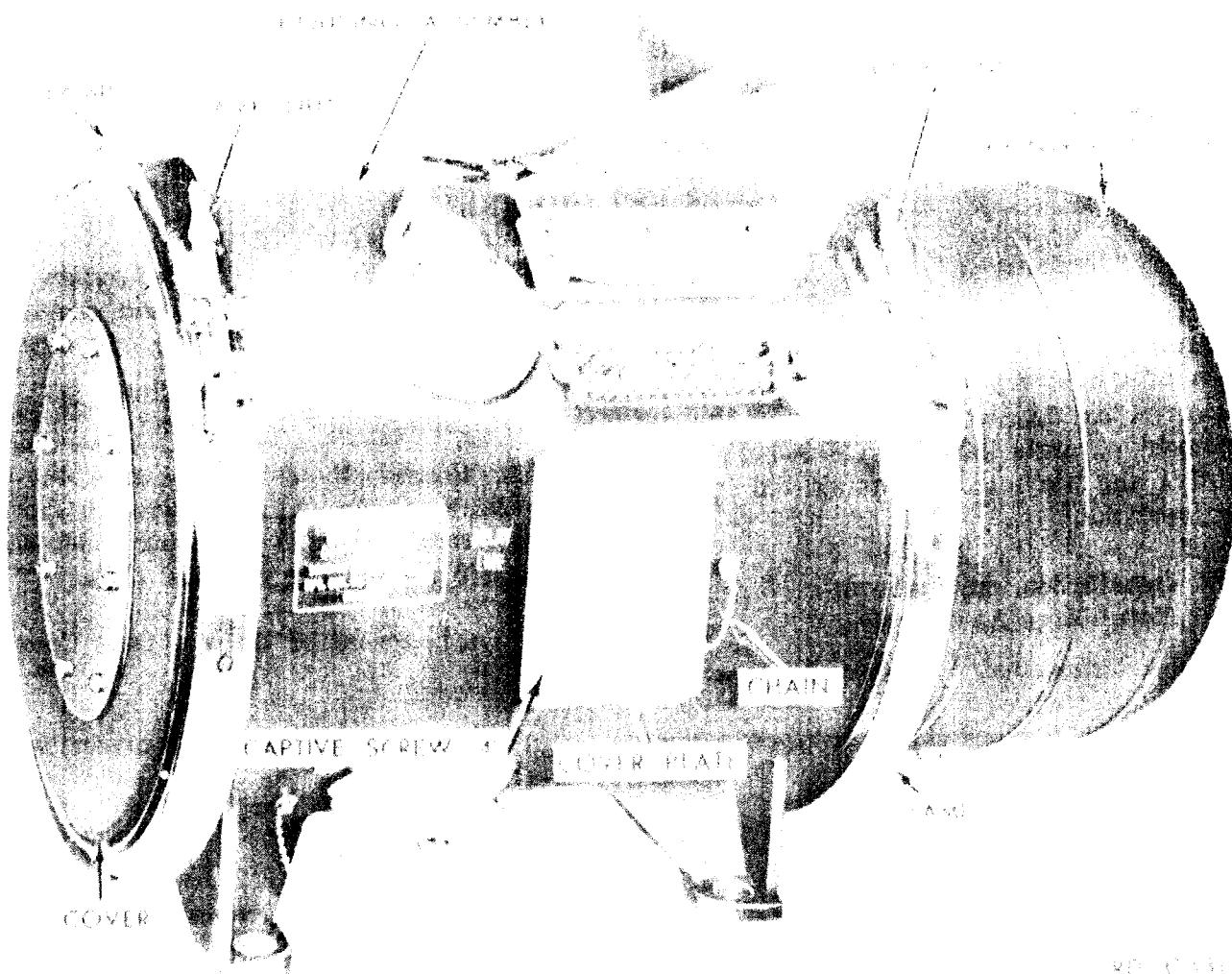
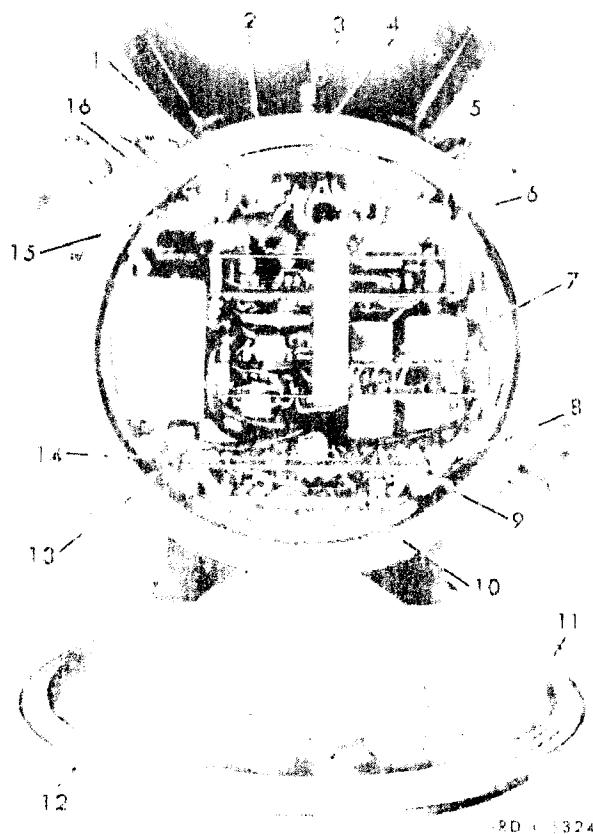


Figure 12-10. Stovepipe transponder control group.



- 1—Bow handle
- 2—Housing assembly
- 3—Air valve
- 4—Pin
- 5—Hexagon adapter
- 6—Locking plate
- 7—Radio set
- 8—Hexagon adapter
- 9—Locking plate
- 10—Bow handle
- 11—Cover
- 12—Gasket
- 13—Locking plate
- 14—Hexagon adapter
- 15—Hexagon adapter
- 16—Locking plate

Figure 12-11. View of the stovepipe transponder control group with the cover removed.

1 pound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.

- (2) Install the gasket on the rear housing cover.
- (3) Position the cover; install the clamp; and tighten the clamp nut.

- (4) Perform the air leakage test on the transponder control group (par. 4-15).
- (5) Remove the nose hinge assembly (par. 12-5b).
- (6) Rerarm the missile, using the applicable procedures in chapter 10.

12-23. Replacement of the Transponder Control Group

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1
- (2) Disconnect the stagnation tube fitting (fig. 12-12) from the transponder control group.
- (3) Install the protective cap on the stagnation tube fitting and the protective plug on the end of the stagnation tube.
- (4) Disconnect the four waveguide assembly sets (6, fig. 12-13) from the transponder control group.
- (5) Disconnect the connector P1 group (fig. 12-14) from the transponder control group connector J1 group.
- (6) Remove the bolts (fig. 12-12), flat washers, and nuts securing the fitting assembly to the forward body section.
- (7) Remove the bolts, flat washers, and nuts securing the feet of the transponder control group.
- (8) Remove the transponder control group.

b. Installation.

- (1) Position the transponder control group (fig. 12-12) in the forward body section.
- (2) Install the bolts, flat washers, and nuts to the feet of the transponder control group; do not tighten.
- (3) Install the bolts, flat washers, and nuts to secure the fitting assembly to the forward body section.
- (4) Torque the nuts and bolts listed in step (2) above to 175 pound-inches and the nuts and bolts listed in step (3) above to a 25 pound-inches.

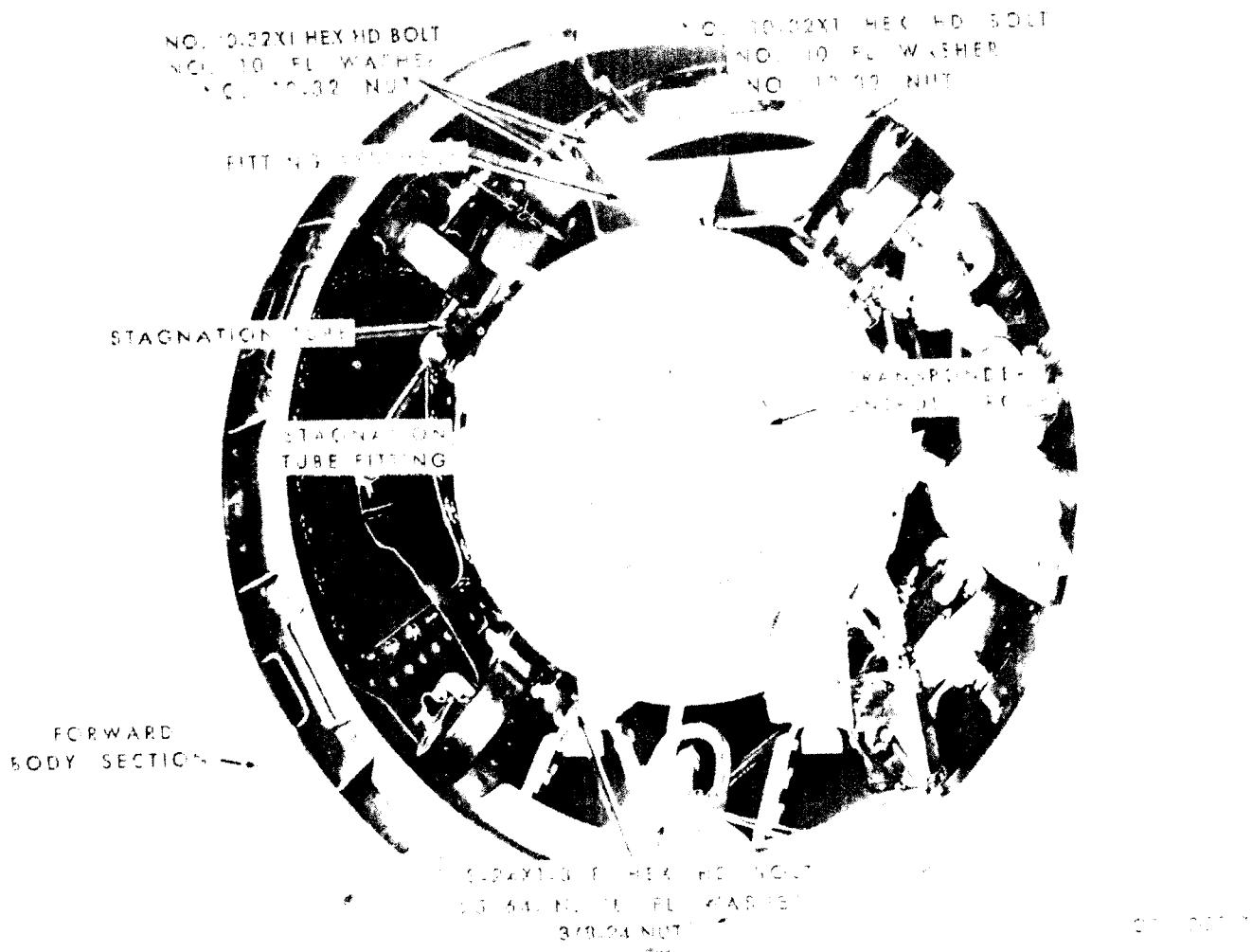


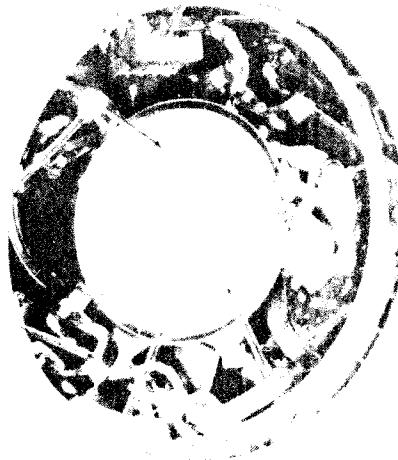
Figure 12-12. Transponder control group mounted in the forward body section, showing the hardware.

- (5) Connect the connector P1 group (fig. 12-14) to the transponder control group connector J1 group.
- (6) Connect the four waveguide assembly sets (6, fig. 12-13) to the transponder control group.
- (7) Blow out the stagnation tube with clean, dry, compressed air.
- (8) Apply sealing compound MIL-S-7502 to the stagnation tube fitting on the transponder control group.
- (9) Connect the stagnation tube (fig. 12-12) to the transponder control group.
- (10) Rerarm the missile as prescribed in chapter 10.

12-29. Replacement of the Missile-Code Delay Line

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the J1 ± XMTR access door.
- (3) Loosen the captive screws (fig. 12-10) holding the cover plate to the housing assembly, and allow the cover plate to hang by the chain.
- (4) Rotate the knob and lever assembly (fig. 12-15) 90 degrees counterclockwise, and carefully slide the missile-code delay line out of the housing assembly.



- 1—Antenna horn
- 2—Captive screws
- 3—Fail-safe control
- 4—Connector P502 group
- 5—Fail-safe control connector J1 group
- 6—Waveguide assembly set
- 7—No. 10-24 x 5/8 pan-hd screw
- 8—No. 10 lockwasher
- 9—No. 10 fl washer
- 10—Transponder control group
- 11—Waveguide assembly set
- 12—Forward body section
- 13—Encased seal

Figure 12-13. Rear view of the forward body section.

b. Installation.

- (1) Insert the missile-code delay line through the opening in the housing assembly, and rotate the knob and lever assembly to lock the missile-code delay line in position.
- (2) Clean the gasket, gasket seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.
- (3) Check that the gasket (fig. 12-15) is properly seated in the groove; assemble the cover plate to the housing

assembly; and secure it in position with the captive screws.

- (4) Perform the air leakage test (par. 4-15).
- (5) Install the J1 ± XMTR access door.

12-30. Replacement of the Radio Set

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.
- (2) Insure that the transponder control group is depressurized by depressing the core in the air valve (3, fig. 12-11).

Note. Steps (3) and (4) are not required when replacing components of the radio set.

- (3) Remove the transponder control group (par. 12-28a).
- (4) Block up the gyro servo control cover (fig. 12-10) to prevent the transponder control group from tipping when the radio set is removed from the housing assembly.
- (5) Loosen the clamp nut, and remove the cover (fig. 12-11) and the gasket (12).
- (6) Rotate the four hexagon adapters on the radio set 90 degrees counter-clockwise to disengage the four locking plates from locking groove in the housing assembly.
- (7) Grasp the two bow handles, and carefully slide the radio set out of the housing assembly.

b. Installation.

Caution: When inserting the radio set into the housing assembly, be careful that the wires and harnesses do not become jammed or pinched.

- (1) Align the groove of the mounting panel (9, fig. 12-16) with the pins in the housing assembly, and carefully slide the radio set into the housing assembly.

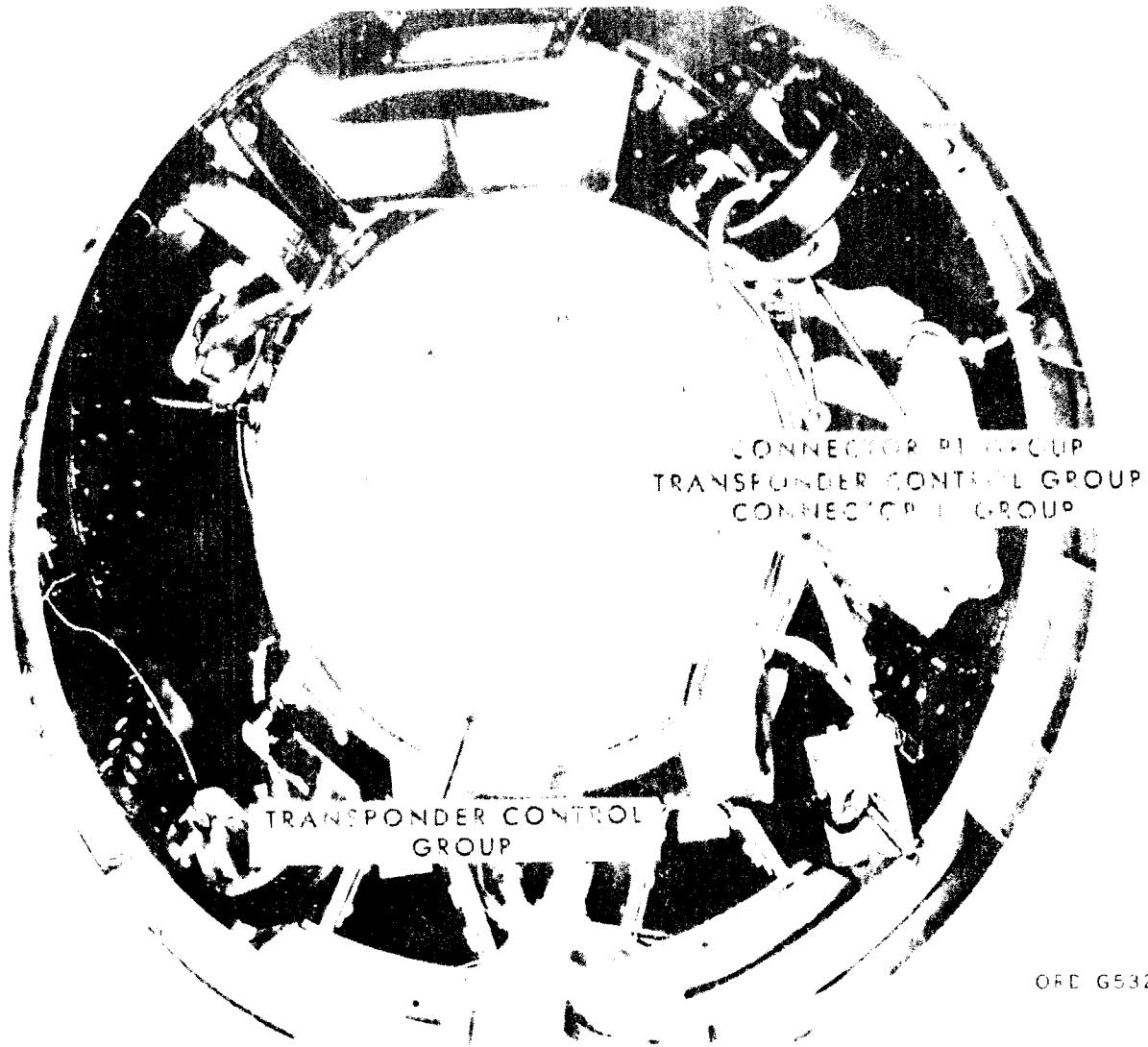


Figure 12-14. Stovepipe transponder-control group mounted in the forward body section, showing connectors.

- (2) Rotate the four hexagon adapters on the radio set 90 degrees clockwise to engage the four locking plates in locking groove in the housing assembly.
- (3) Remove the screws (7, fig. 12-13), lockwashers (8), and flat washers (9); remove the encased seal (13) and the desiccant. If the desiccant is deactivated, install new desiccant.
- (4) Install the desiccant and the encased seal, and secure with the screws, lockwashers, and flat washers.
- (5) Clean the gasket, gasket seal, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.
- (6) Install the gasket in the groove in the cover.
- (7) Position the cover; install clamp (fig. 12-10); and tighten the clamp nut.

Note. Install the transponder control group (par. 12-28b) if removed in a above.

- (8) Perform the air leakage test (par. 4-15).

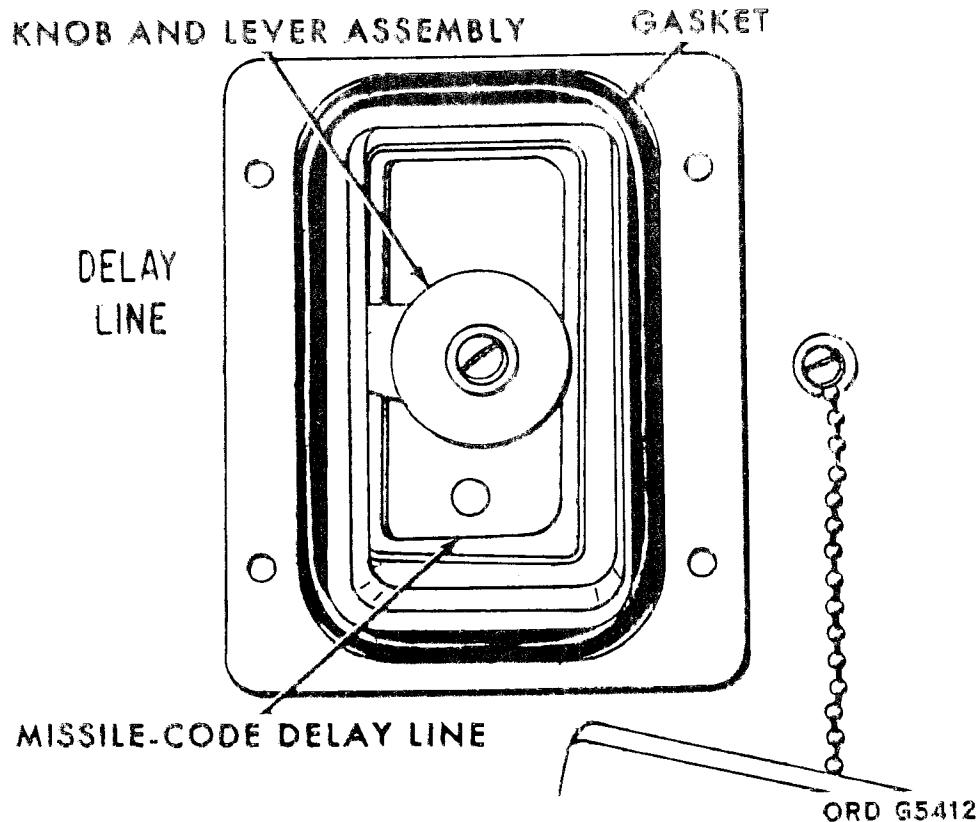


Figure 12-15. Removal of the missile-code delay line cover plate.

(9) Remove the nose hinge assembly (par. 12-5b).

(10) Rerarm the missile as prescribed in chapter 10.

12-31. Replacement of the Signal Data Converter

a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Insure that the transponder control group is depressurized by depressing the core in the air valve (3, fig. 12-11).

(3) Remove the radio set (par. 12-30a).

(4) Position the radio set with the bow handles resting on the bench.

(5) Loosen the plate captive screws (6, fig. 12-17) that secure the mounting plate group to the radio set.

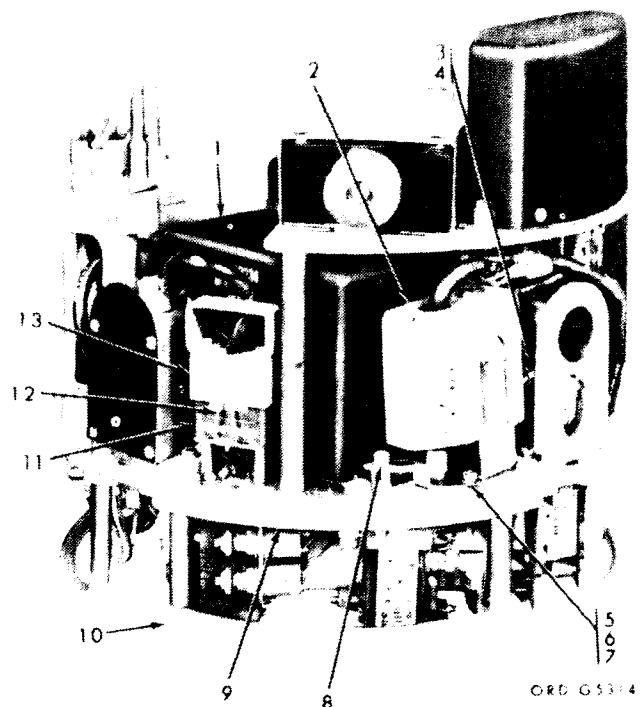
(6) Loosen and remove the screw (7, fig. 12-17), and remove the mounting plate group (3) from the radio set.

(7) Disconnect the signal data converter connectors P3 (6, fig. 12-18) P2 (8), and the amplifier-decoder connectors P4 (10) and P5 (7) from the delay line driver-detector connectors J3 (14), J5 (11), J2 (13), and J4 (12), respectively.

(8) Remove the screw (5, fig. 12-16), flat washer (6), and lockwasher (7) that partially secure the tapped delay line (2) to the mounting panel.

(9) Loosen the captive screw (8) securing the tapped delay line (2) to the radar modulator (1) and carefully pull out far enough to provide access to the tapped delay line connector J1 (3).

(10) Disconnect the signal data converter connector P4 (15, fig. 12-18) from the tapped delay line connector J1 (15).



1—Radar modulator
 2—Tapped delay line
 3—Tapped delay line connector J1
 4—Signal data converter connector P4
 5—No. 6-32 x 3/8 fil-hd screw
 6—No. 6 fl washer
 7—No. 6 lockwasher
 8—Captive screw
 9—Mounting panel
 10—Signal data converter
 11—Mounting panel connector J2 group
 12—Connector spring clamp
 13—Radar modulator connector P1 group

Figure 12-16. Side view of the radio set.

(11) Disconnect the signal data converter connector P5 (5) from the amplifier-decoder connector J1 (4).

(12) Loosen the captive screws (fig. 12-19) that secure the signal data converter to the radio set.

(13) Remove the signal data converter from the radio set.

b. Installation.

(1) Insert the four cables from the signal data converter through the opening in the mounting panel of the radio set, and carefully align the signal data converter to the radio set.

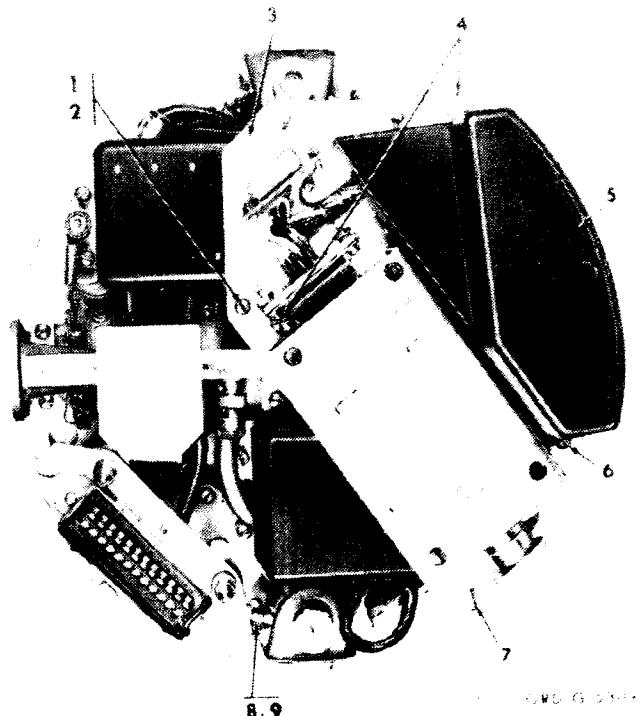


Figure 12-17. Top view of the radio set.

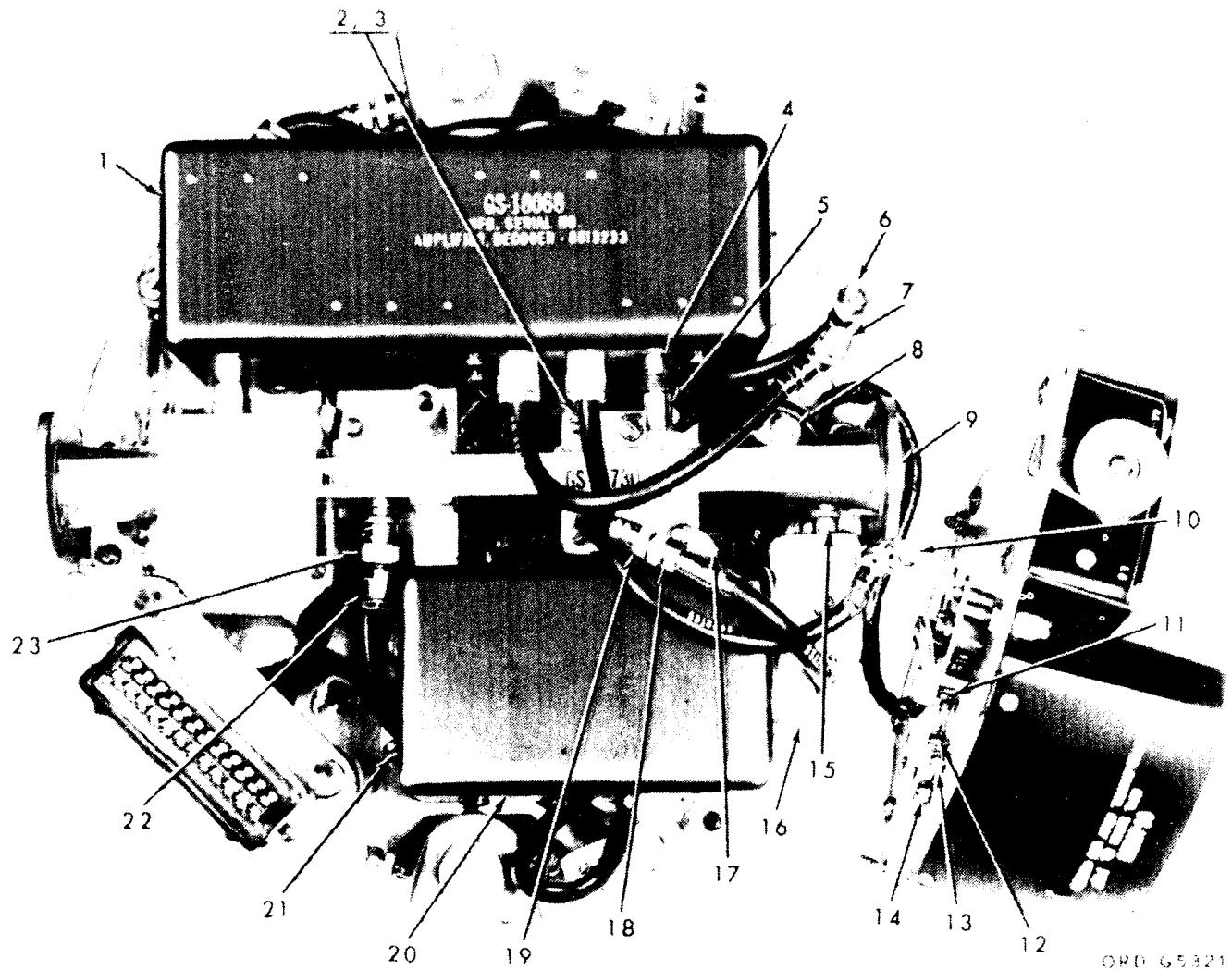
(2) Tighten the four captive screws that secure the signal data converter to the radio set.

(3) Connect the signal data converter connector P5 to the amplifier-decoder connector J1.

(4) Connect the signal data converter connector P4 to the tapped delay line connector J1.

(5) Position the tapped delay line, and secure it with the captive screw, fillister-head screw, flat washer, and lockwasher.

(6) Connect the signal data converter connectors P2 (8, fig. 12-18), P3 (6), and the amplifier-decoder connectors P4 (10) and P5 (7) to the



- 1—Amplifier decoder
- 2—No. 8-32 x 1/4 fil-hd screw (4)
- 3—No. 8 lockwasher (4)
- 4—Amplifier-decoder connector J1
- 5—Signal data converter connector P5
- 6—Signal data converter connector P3
- 7—Amplifier-decoder connector P5
- 8—Signal data converter connector P2
- 9—Transmitter waveguide assembly
- 10—Amplifier decoder connector P4
- 11—Delay line driver-detector connector J5
- 12—Delay line driver-detector connector J4

- 13—Delay line driver-detector connector J2
- 14—Delay line driver-detector connector J3
- 15—Signal data converter connector P4 and tapped delay line connector J1
- 16—Tapped delay line
- 17—Ground strap
- 18—Tapped delay line connector P1
- 19—Radar modulator connector P2
- 20—Radar modulator
- 21—Captive screw
- 22—Radar modulator connector P3
- 23—Magnetron electron tube connector J4

Figure 12-18. Top view of a partially disassembled radio set.

delay line driver-detector connectors J5 (11), J3 (14), J2 (13), and J4 (12), respectively.

(7) Secure the mounting plate group (3, fig.

12-17) in position with the two plate captive screws (4).

(8) Install the flathead screw on the mounting plate group and tighten them.

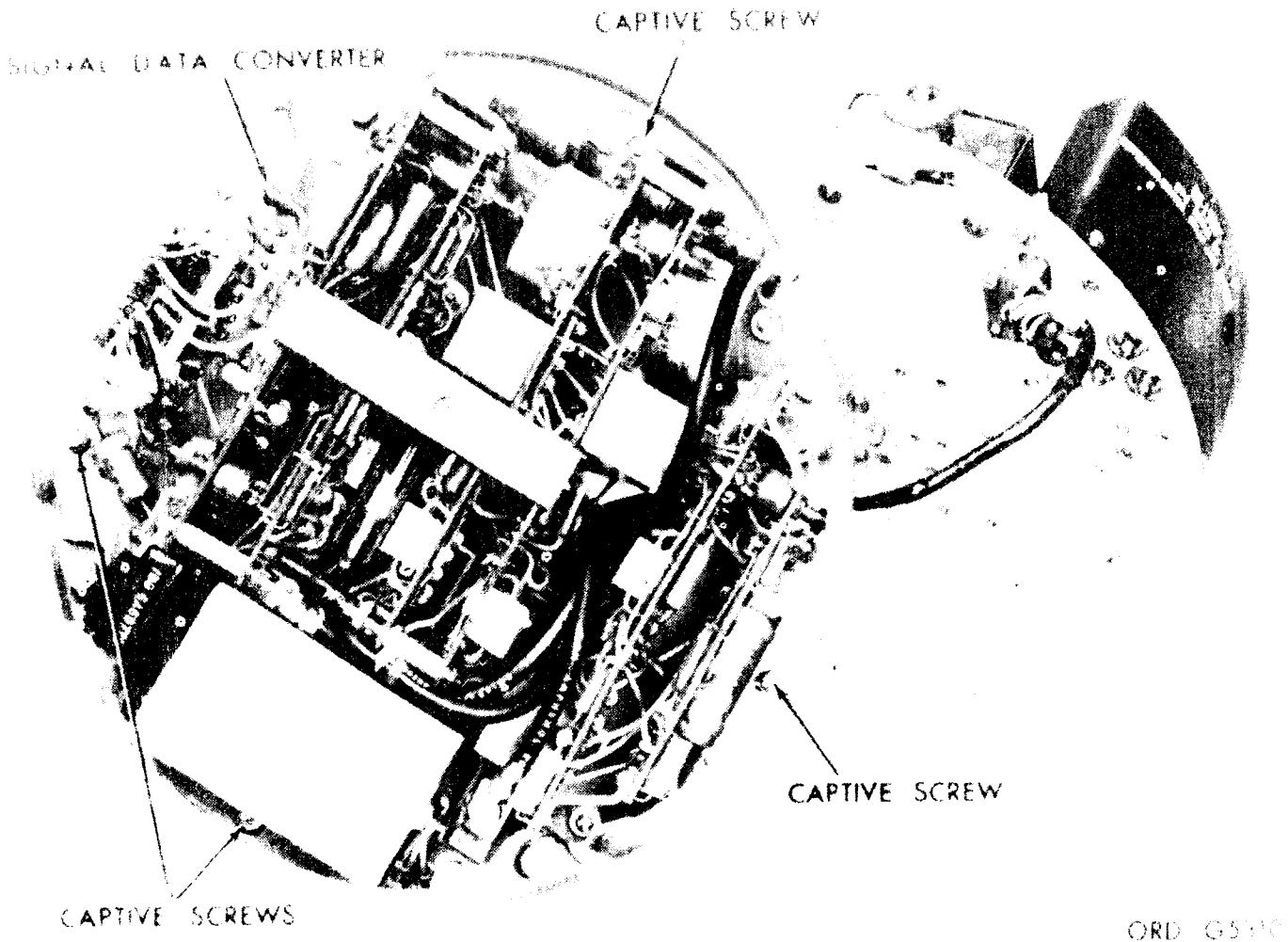


Figure 12-19. Bottom view of the radio set.

(9) Install the radio set (par. 12-30b).

12-32. Replacement of Gyro Servo Control

a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Remove the radio set (par. 12-30a).

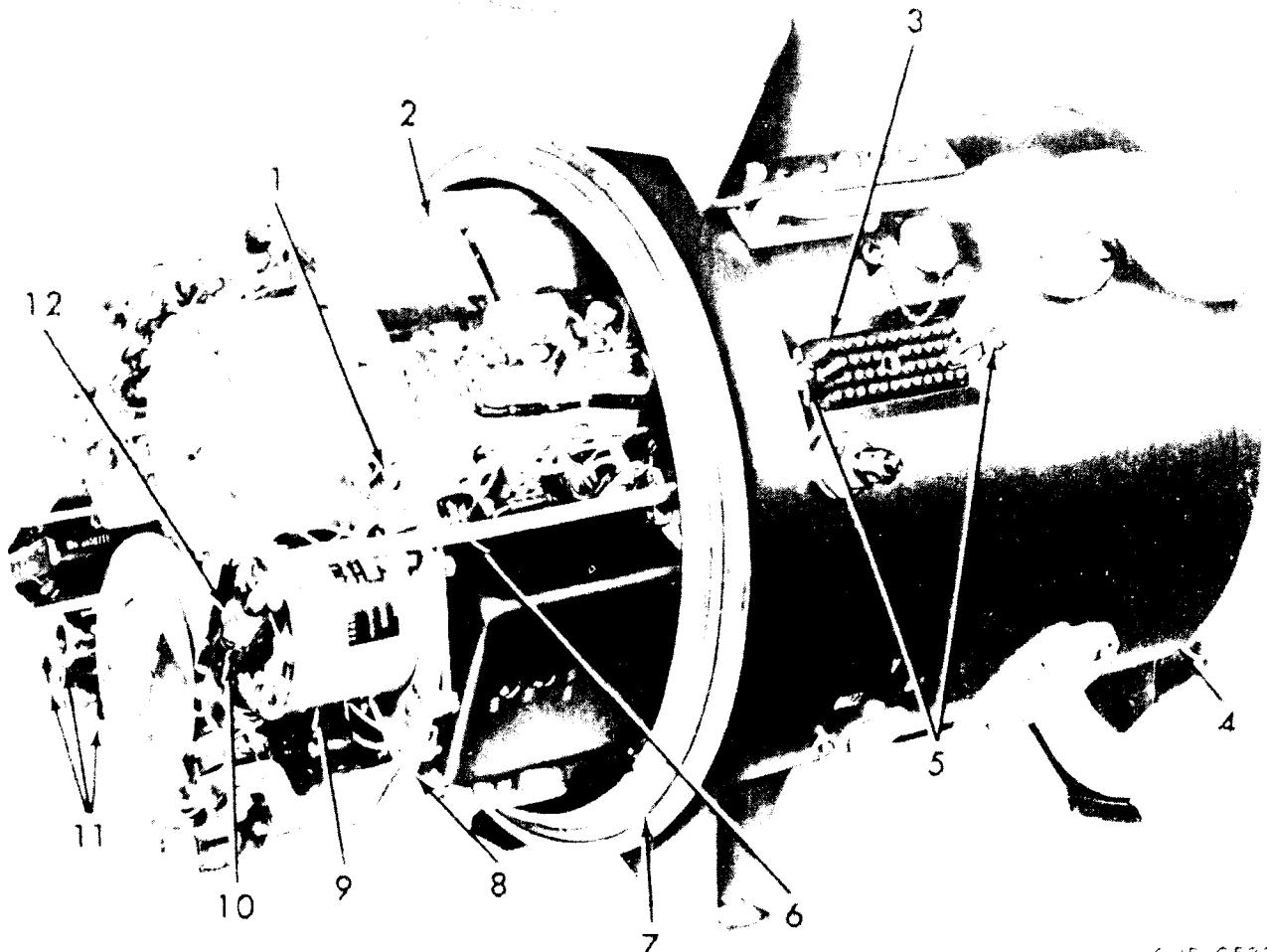
(3) Loosen the clamp nut (fig. 12-10), and remove the clamp, gyro servo control cover, and gasket.

(4) Disengage the female fitting of the pressure tube at the pressure transmitter.

(5) Cover the male fitting on the pressure transmitter with the protective cap or with masking tape, and cap the end of the pressure tube attached to the housing assembly.

(6) Rotate the five hexagon adapters (10, fig. 12-21) on the gyro servo control 90 degrees counterclockwise to disengage the five locking plates from the locking groove in the housing assembly.

(7) Loosen the two captive screws (fig. 12-20) that secure the housing assembly connector J2 group and its gasket to the housing assembly.



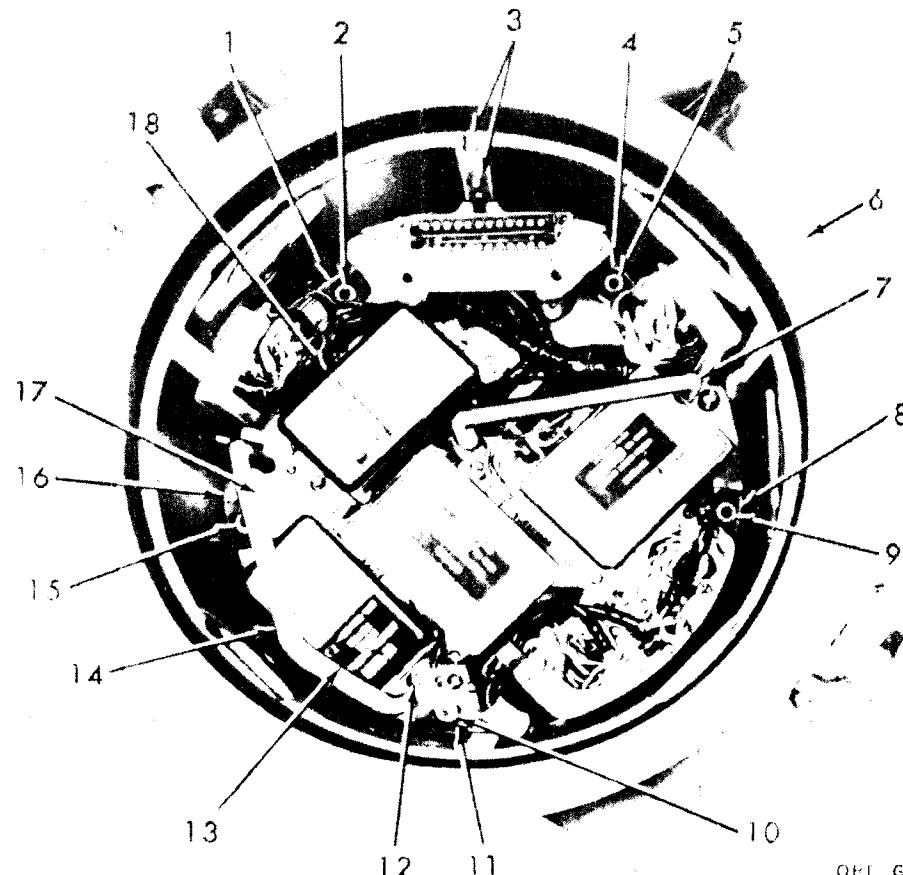
C-4-D G5323

1—No. 10 lock washer and no. 10-24 x 5/8 fil-hd screw
 2—Gyro servo control
 3—Housing assembly connector J2 group and gasket
 4—Housing assembly
 5—Captive screw
 6—Pressure tube
 7—Gasket
 8—Power supply
 9—Pressure transmitter
 10—Female fitting
 11—Voltage regulator electron tubes
 12—Male fitting

Figure 12-20. Transponder control group with the gyro servo control cover removed.

(8) Loosen the two captive screws (fig. 12-22) that secure the housing assembly connector J1 group and its gasket to the housing assembly.
 (9) Carefully manipulate the housing assembly connector J1 group (2, 12-22) and gasket (3) and housing as-

sembly connector J2 group and gasket (3, fig. 12-20) out of openings in the housing assembly to prevent damage to the connector prongs.
 (10) Remove the gaskets from the housing assembly connector groups J1 and J2 (figs. 12-20 and 12-22).



OFT 65322

1—Locking plate
 2—Hexagon adapter
 3—Pin
 4—Locking plate
 5—Hexagon adapter
 6—Housing assembly

7—Bow handle
 8—Locking plate
 9—Hexagon adapter
 10—Hexagon adapter
 11—Locking plate
 12—Captive screw

13—Y steering amplifier
 14—Bow handle
 15—Hexagon adapter
 16—Locking plate
 17—Gyro servo control
 18—P steering amplifier

Figure 12-21. Rear view of the transponder control group with the radio set removed.

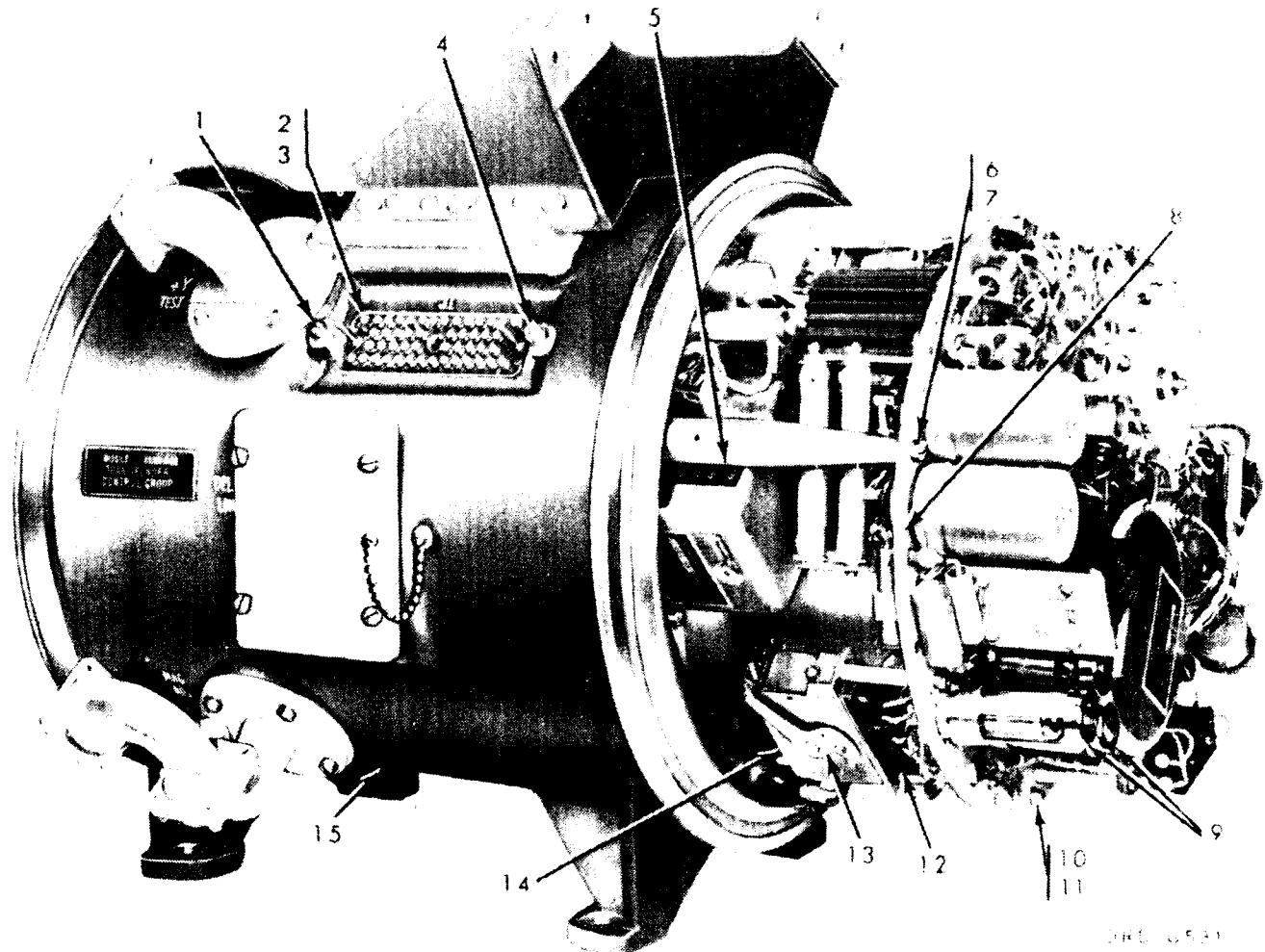
Caution: Carefully slide the gyro servo control out of the housing assembly to avoid damaging the connector prongs.

(11) Grasp the bow handles (7, fig. 12-21), and remove the gyro servo control (17) from the housing assembly.

b. Installation.

Caution: Install the gyro servo control in the housing assembly carefully to prevent pinching the wires and damaging the connectors.

- (1) Align the groove of the gyro servo control to the pins in the housing assembly, and carefully slide the gyro servo control into the housing assembly.
- (2) Position the corresponding gaskets on the housing assembly connector J1 group and the housing assembly connector J2 group on the gyro servo control.
- (3) Carefully manipulate the housing assembly connector J1 group and its gasket and housing assembly con-



| | |
|---------------------------------------|---|
| 1—Captive screw | 9—Tube shield |
| 2—Housing assembly connector J1 group | 10—No. 10-24 x 5/8 fil-hd screw |
| 3—Gasket | 11—No. 10 lockwasher |
| 4—Captive screw | 12—Power supply connector P1 group |
| 5—Gyro servo control | 13—Connector latch |
| 6—No. 10-24 x 5/8 fil-hd screw | 14—Gyro servo control connector, P1 group |
| 7—No. 10 lockwasher | 15—Housing assembly |
| 8—Power supply | |

Figure 12-22. Transponder control group, showing the gyro servo control.

necter J2 group and its gasket through openings in the housing assembly to prevent damage to the connector prongs.

(4) With the two captive screws, secure the housing assembly connector J2 group and its gasket to the housing assembly.

(5) Secure the housing assembly connector J1 group and its gasket to the housing assembly with the two captive screws.

(6) Rotate the five hexagon adapters on the gyro servo control 90 degrees clockwise to engage

the five locking plates with the locking groove in the housing assembly.

(7) Remove the cap on the end of the pressure tube, and blow out the tube with clean, dry, compressed air.

(8) Connect the female fitting of the pressure tube to the male fitting on the pressure transmitter, and tighten.

NOTE. It may be necessary to bend the tube slightly to achieve alignment with the fitting. Bend the tube only as much as it is necessary to achieve alignment.

(9) Install the gasket in the groove on the housing assembly.

(10) Align the gyro servo control cover, and assemble the clamp around the housing assembly.

(11) Tighten the clamp nut to seat the clamp.

(12) Install the radio set (par. 12-30b).

12-33. Replacement of Power Supply

a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Remove the transponder control group (par. 12-28a).

(3) Loosen the clamp nut (fig. 12-10, and remove the gyro servo control cover and gasket.

(4) Disconnect the female fitting of the pressure tube at the pressure transmitter.

(5) Release the connector latch on the gyro servo control connector P1 group, and disconnect the connector P1 group from the power supply connector J1 group.

(6) Remove the screws (figs. 12-20 and 12-22) and lockwashers that secure the power supply.

CAUTION: Be careful when removing the power supply from the gyro servo control to prevent damage to the connectors and wires.

(7) Remove the power supply from the gyro servo control.

b. Installation.

(1) Position the power supply on the gyro servo control.

(2) Secure the power supply to the gyro servo control with the screws (figs. 12-20 and 12-22) and lockwashers.

(3) Connect the gyro servo control connector P1 group to the power supply connector J1 group and secure it with the connector latch.

(4) Install the gyro servo control in the housing assembly (par. 12-32b).

12-34. Replacement of the Radar Modulator

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a).

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate (3) to the radio set.

(4) Remove the screw partially securing the mounting plate group (3) to the radio set.

(5) Disconnect the signal data converter connectors P3 (6, fig. 12-18), P2 (8), and the amplifier-decoder connectors P4 (10) and P5 (7) from the delay-line driver-detector connectors J3 (14), and J4 (12), respectively.

(6) Release the connector spring clamp (12, fig. 12-16) on the radar modulator connector P1 group (13), and disconnect the connector P1 group from the mounting panel connector J2 group (11).

(7) Disconnect the radar modulator connector P2 (19, fig. 12-18) from the tapped delay line connector P1 (18).

(8) Remove the screw, flat washer, and lockwasher partially securing the tapped delay line to the mounting panel.

(9) Loosen the captive screw (21) securing the tapped delay line (16) to the radar modulator and carefully move the tapped delay line to provide access to the captive screws.

(10) Loosen the captive screws (21) securing the radar modulator (20) to the mounting panel.

(11) Disconnect the radar modulator connector P3 (22) from the magnetron electron tube con-

necter J4 (23) and lift the radar modulator out of the radio set.

b. Installation.

(1) Connect the radar modulator connector P3 to the magnetron electron tube connector J4, and position the radar modulator (20) on the mounting panel.

(2) Tighten the captive screws securing the radar modulator (20) to the mounting panel.

(3) Position the tapped delay line, and secure it with the captive screw, flat washer, and lockwasher.

(4) Connect the tapped delay line connector P1 to the radar modulator connector P2.

(5) Connect the radar modulator connector P1 group to the mounting panel connector J2 group, and engage the connector spring clamp.

(6) Connect the signal data converter connectors P2 and P3 and the amplifier-decoder connectors P4 and P5 to the delay-line driver-detector connectors, J5, J3, J2, and J4, respectively.

(7) Secure the mounting plate group in position with the two plate captive screws.

(8) Apply sealing compound MIL-S-7502 to threads of the flathead screw.

(9) Install the flathead screw (fig. 12-17) on the mounting plate, and tighten.

(10) Install the radio set (par. 12-30b).

12-35. Replacement of the Radar Modulator Thyatron Electron Tube

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radar modulator (par. 12-34a).

(3) Remove the electron tube shield (fig. 12-23) and the thyatron electron tube.

b. Installation.

NOTE. To prevent accidental bending, ascertain that base pins of the electron tube are straight before installing it. Use a pin straightener, if available.

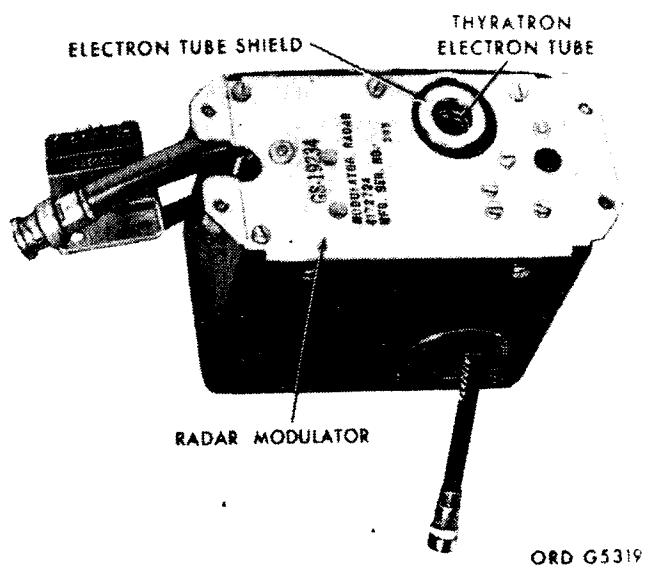


Figure 12-23. Bottom view of the radar modulator.

- (1) Insert the thyatron electron tube (fig. 12-23) firmly in the radar modulator.
- (2) Install the electron tube shield.
- (3) Install the radar modulator (par. 12-34b).

12-36. Replacement of the Delay Line Driver-Detector

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a). Position the radio set with the bow handles resting on the bench.

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate (3) to the radio set.

(4) Remove the flathead (1) screw partially securing the mounting plate group to the radio set.

(5) Disconnect signal data converter connectors P3 (6, fig. 12-18) P2 (8) and amplifier-decoder connectors P4 (10) and P5 (7) from delay line driver-detector connectors J3 (14), J5 (11), J2 (13), and J4 (12), respectively.

(6) Rotate the knob and lever assembly (fig. 12-15) 90 degrees counterclockwise, and carefully remove the missile-code delay line.

(7) Loosen the captive screws (fig. 12-17), and remove the screw and lockwasher securing the delay line driver-detector to the mounting plate group.

(8) Remove the delay line driver-detector from the mounting plate group.

b. Installation.

(1) Position the delay line driver-detector on the mounting plate group, and secure it in position with the three captive screws, fillister-head screw, and lockwasher.

(2) Connect signal data converter connectors P2 and P3 (fig. 12-18) and amplifier-decoder connectors P4 and P5 to delay line driver-detector connectors J5, J3, J2, and J4, respectively.

(3) Secure the mounting plate group in position with the two plate captive screws.

(4) Apply a sealing compound to the threads of the flathead screw, and install the flathead screw on the mounting plate and tighten.

(5) Install the missile-code delay line (fig. 12-15), and rotate the knob and lever assembly 90 degrees clockwise to lock the missile-code delay line in position.

(6) Install the radio set (par. 12-30b).

12-37. Replacement of the Amplifier-Decoder

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a), and position it with the bow handles resting on the bench.

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate group (3) to the radio set.

(4) Loosen and remove the flathead screw that partially secures the mounting plate group to the radio set.

(5) Disconnect signal data converter connectors P3 (6, fig. 12-18) and P2 (8), and amplifier-decoder connectors P4 (10) and P5 (7) from delay line driver-detector connectors J3 (14), J5 (11), J2 (13), and J4 (12), respectively.

(6) Disconnect signal data converter connector P5 (5) from amplifier-decoder connector J1 (4).

(7) Release the connector spring clamp (9, fig. 12-24) on amplifier-decoder connector P1 group (10), and disconnect connector P1 group from mounting panel connector J3 group (8).

(8) Disconnect amplifier-decoder connector P2 (3) from RF detector connector J1 (4).

(9) Disconnect amplifier-decoder connector P3 (9, fig. 12-17) from RF detector connector J2 (8).

(10) Loosen the four captive screws (5, fig. 12-24), and carefully lift the amplifier-decoder (2) out of the radio set.

b. Installation.

(1) Install the amplifier-decoder (2) on the radio set, and secure in position with the four captive screws.

(2) Connect amplifier-decoder connector P3 (9, 12-17) to RF detector connector J2 (8).

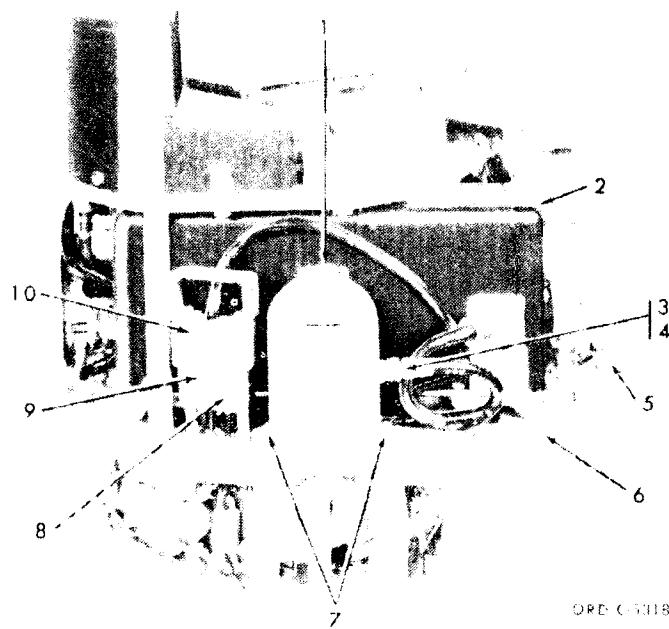
(3) Connect amplifier-decoder connector P2 (3, 12-24) to RF detector connector J1 (4).

(4) Connect amplifier-decoder connector P1 group (10) to mounting panel connector J3 group (8), and engage the connector spring clamp (9).

(7) Secure the mounting plate group (3, fig. 12-17) in position with the two plate captive screws (4).

(8) Apply sealing compound to the threads of the flathead screw, and install the screw to the mounting plate group; tighten screw.

(9) Install the radio set (par. 12-30b).



- 1—RF detector
- 2—Amplifier decoder
- 3—Amplifier decoder connector P2
- 4—RF detector connector J1
- 5—Captive screws
- 6—Mounting panel
- 7—No. 8-32 x 1/2 fil-hd screws
- 8—Mounting panel connector J3 group
- 9—Connector spring clamp
- 10—Amplifier decoder connector P1 group

Figure 12-24. Side view of the radio set showing the RF detector.

12-38. Replacement of the Magnetron Electron Tube

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the signal data converter (par. 12-31a).
- (3) Remove the four captive screws securing the radar modulator (fig. 12-16) to the radio set.
- (4) Disconnect the radar modulator connector P3 (22, fig. 12-18) from the magnetron electron tube connector J4 (23) and remove the radar modulator (20).
- (5) Remove the screws (2) and lockwashers (3) securing the magnetron electron tube (fig.

12-25) to the transmitter waveguide assembly (9, fig. 12-18).

CAUTION: Use care in removing the magnetron electron tube to prevent dropping or knocking it.

(6) Manipulate the magnetron electron tube (fig. 12-25) through opening in the mounting panel.

CAUTION: Keep iron, steel, or magnets at least 2 inches from the magnetron electron tube after its removal to minimize magnetic attraction which will impair its efficiency.

b. Installation.

(1) Manipulate the magnetron electron tube into position through opening in the mounting panel.

CAUTION: Be sure the ground is installed so that it does not touch the magnetron electron tube.

(2) Position the group strap (17, fig. 12-18), and secure the magnetron electron tube (fig. 12-25) to the transmitter waveguide assembly (9, fig. 12-18) with the screws (2) and lockwashers (3).



Figure 12-25. Radio set with the signal data converter removed.

(3) Connect radar modulator connector P3 (22) to magnetron electron tube connector J4 (23).

(4) Install the radar modulator (20) and secure it with the four captive screws (21).

(5) Install the signal data converter (par. 12-31b).

12-39. Replacement of the Rectifying Crystal Unit

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a) and position it with the bow handles resting on the bench.

(3) Use a spanner wrench to unscrew and remove the cap (fig. 12-26) from the RF detector.

(4) Remove the chuck with the rectifying crystal unit attached.

CAUTION: Ground the chuck to prevent the rectifying crystal unit from being damaged by static charges from maintenance personnel or from ungrounded equipment.

(5) Push the rectifying crystal unit from the chuck.

b. Installation.

NOTE. If only one rectifying crystal unit is to be replaced in the radio set, it must be replaced with a rectifying crystal unit of the same type as the one already installed.

CAUTION: Handle the rectifying crystal unit by the ground (large end) ONLY.

(1) Carefully insert the replacement rectifying crystal unit (fig. 12-26) in the chuck, and check that the jaws of the chuck exert light pressure on the crystal unit.

(2) Secure the crystal unit fingertight in the chuck.

(3) Insert the chuck in the RF detector.

(4) Install the cap, and secure it with the spanner wrench.

(5) Ensure that the crystal is securely seated in the chuck.

(6) Install the radio set (par. 12-30b).

12-40. Replacement of Voltage Regulator Tubes V1, V2, and V3

a. Removal.

(1) Remove the transponder control group (par. 12-28a).

(2) Loosen the clamp nut (fig. 12-10), remove the clamp, gyro servo control cover, and gasket (fig. 12-20).

(3) Remove the three tube shields (9, fig. 12-22) and three voltage regulator tubes (fig. 12-26) from the power supply.

b. Installation.

NOTE. Ascertain that the base pins of each tube are straight before installing to prevent accidental bending. Use a pin straightener, if available.

(1) Insert the tubes firmly into the power supply.

(2) Install the three tube shields.

(3) Clean the gasket, gasket seat, and free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.

(4) Assemble the gasket to the groove in the housing assembly.

(5) Align the gyro servo control cover, and assemble the clamp around the housing assembly.

(6) Tighten the clamp nut to the seat clamp.

(7) Install the transponder control group (par. 12-28b).

12-41. Replacement of Roll Control Amplifier

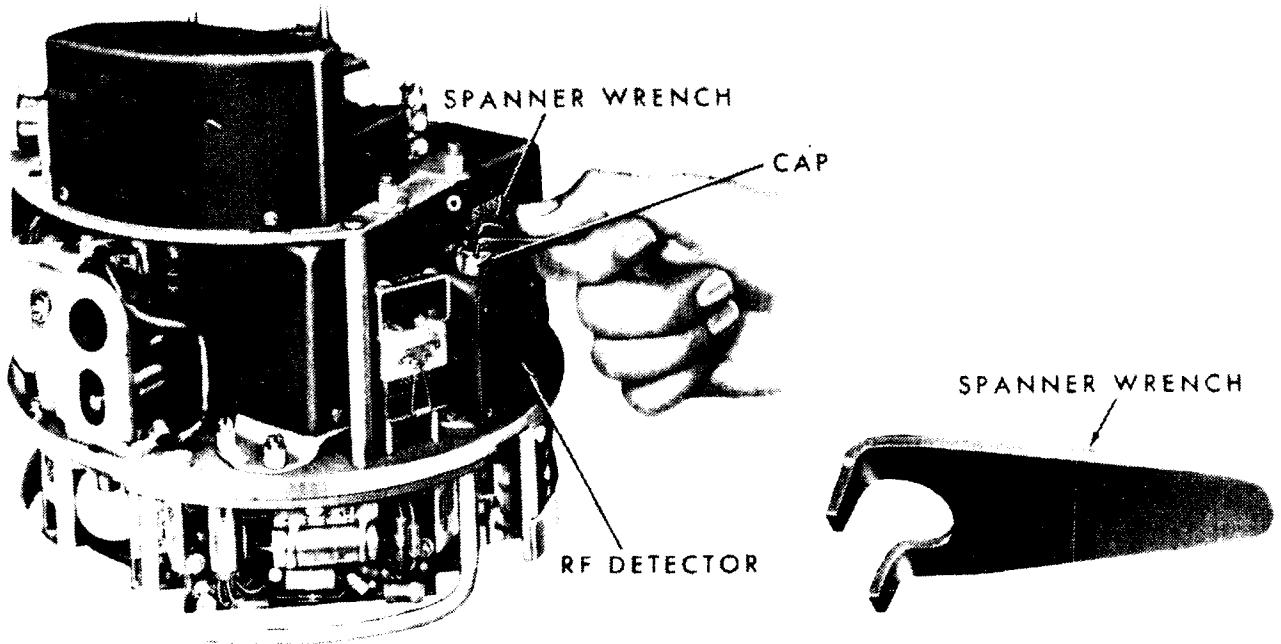
a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

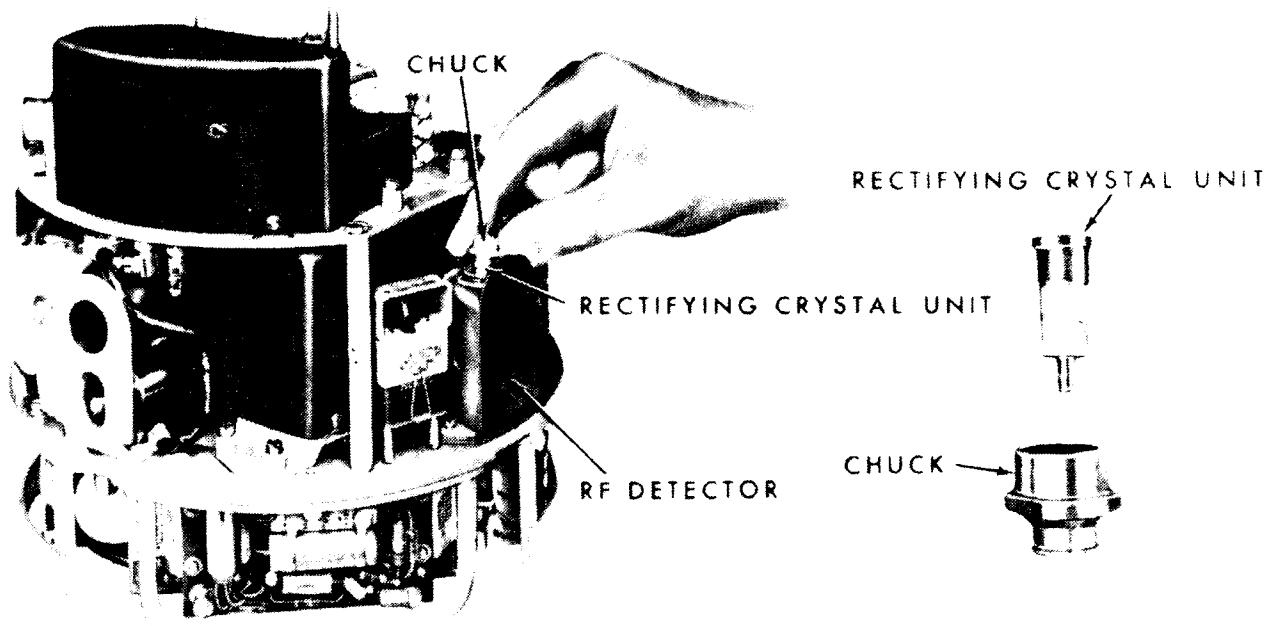
(2) Remove the power supply (par. 12-33a).

(3) Loosen the two captive screws (fig. 12-27) that secure the roll control amplifier to the gyro servo control.

(4) Remove the roll control amplifier from the gyro servo control.



A—REMOVING CAP WITH SPANNER WRENCH



B—REMOVING RECTIFYING CRYSTAL UNIT
FROM RF DETECTOR

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Figure 12-26. Removal of the rectifying crystal unit.

- (2) Install the gyro servo control (par. 12-32b).

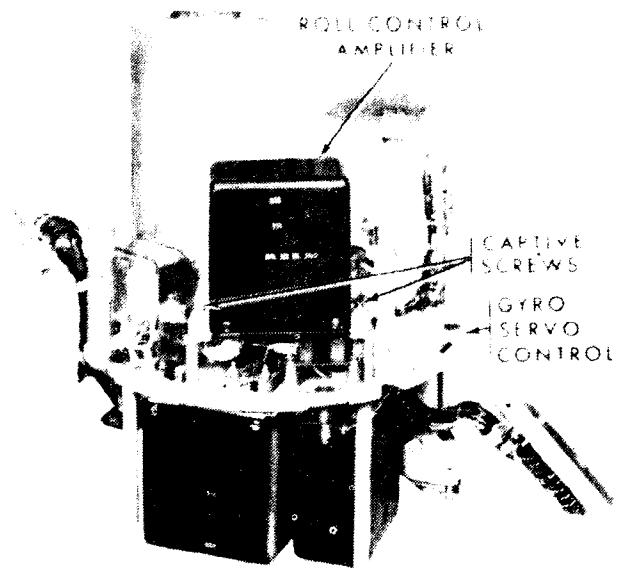


Figure 12-27. Gyro servo control with the power supply removed.

b. Installation.

(1) Install the roll control amplifier on the gyro servo control, and secure the amplifier in position with the two captive screws.

(2) Install the power supply (par. 12-33b).

12-42. Replacement of the Y Steering Amplifier

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the gyro servo control (par. 12-32a), and position it carefully on its side.

(3) Loosen the captive screws (fig. 12-21) securing the Y steering amplifier to the gyro servo control.

(4) Remove the Y steering amplifier from the gyro servo control.

b. Installation.

(1) Install the Y steering amplifier on the gyro servo control, and secure the amplifier in position with the captive screws.

12-43. Replacement of the P Steering Amplifier

a. Removal.

(1) Remove the radio set (par. 12-30a) and position the radio set with the bow handles resting on the bench.

NOTE. The P steering amplifier removal is performed with the gyro servo control in the housing assembly.

(2) Loosen the captive screws (12, fig. 12-21) securing the P steering amplifier (18) to the gyro servo control (17).

(3) Remove the P steering amplifier from the gyro servo control.

b. Installation.

(1) Install the P steering amplifier on the gyro servo control, and secure the amplifier in position with the captive screws.

(2) Install the radio set (par. 12-30b).

12-44. Replacement of the Tapped Delay Line

a. Removal.

(1) Remove the radio set (par. 12-30a), and position the radio set with the bow handles resting on the bench.

(2) Remove the screw (fig. 12-16), flat washer, and lockwasher partially securing the tapped delay line to the mounting panel.

(3) Loosen the captive screw securing the tapped delay line to the radar modulator, and carefully pull the tapped delay line out of the way to provide access to tapped delay line connector P1 (18, fig. 12-18) and tapped delay line connector J1 (15).

(4) Disconnect radar modulator connector P2 (19) from tapped delay line connector P1 (18).

(5) Disconnect signal data converter connector P4 (15) from tapped delay line connector J1, and remove the tapped delay line (16).

b. Installation.

- (1) Connect signal data converter connector P4 to tapped delay line connector J1.
- (2) Connect radar modulator connector P2 to tapped delay line connector P1.
- (3) Position the tapped delay line, and secure it in position with the captive screw, screw, flat washer, and lockwasher.
- (4) Install the radio set (par. 12-30b).

**12-45. Replacement of RF Detectors
8172668 and 8172699***a. Removal.*

- (1) Remove the radio set (par. 12-30a), and position it with the bow handles resting on the bench.
- (2) Disconnect amplifier-decoder connector P2 (fig. 12-24) from RF detector connector J1.
- (3) Remove the screws, and carefully lift the RF detector from the mounting panel.

NOTE. Both the RF detectors are removed in a similar manner. The RF detector which is not specified above

Section IV. CORRECTIVE MAINTENANCE OF THE FORWARD BODY SECTION**12-47. Replacement of the Access Door Assemblies**

- a. Prepare the missile as prescribed in table 12-1.
- b. For detailed removal and installation procedures, refer to paragraphs 3-13, 3-14, and 7-6.

12-48. Replacement of the Ram-Pressure Probe (Missiles 10206 through 11935)*a. Removal.*

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward body section access door assemblies (par. 3-13).
- (3) Reach through the opening, and disconnect the reducer (1, fig. 12-29) from the ram-pressure probe (5).
- (4) Remove the screws (4) that secure the ram-pressure probe to the forward fin assembly (2).
- (5) Remove the closure (3) from the ram-pressure probe.

is wired from amplifier-decoder connector P3 to RF detector connector J2.

b. Installation.

- (1) Position the RF detector (1, fig. 12-24), and secure it in position with the screws.
- (2) Connect amplifier-decoder connector P2 (3) to RF detector connector J1 (4).
- (3) Install the radio set (par. 12-30b).

12-46. Adjustment of the Missile Response Time*a. Remove the radio set (par. 12-30a).*

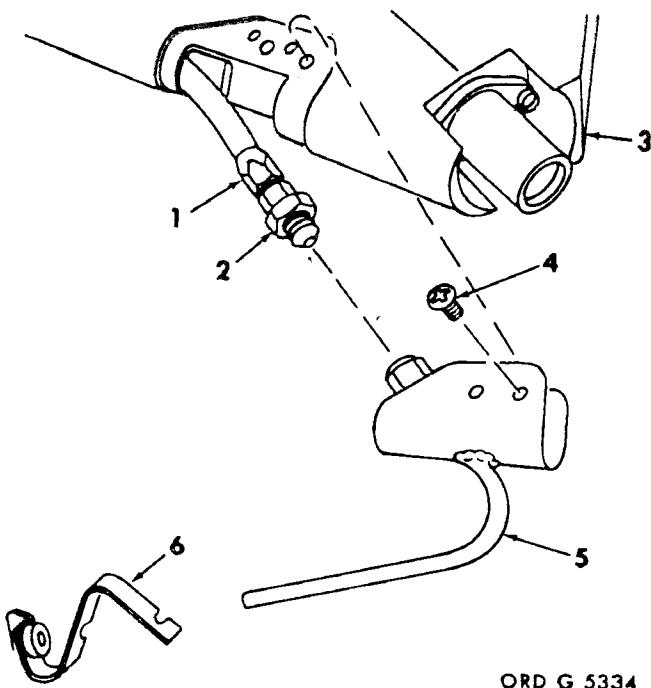
b. Adjust the DELAY LINE ADJUST switch on the TAPPED DELAY LINE (fig. 12-16) to 850 ± 15 millimicroseconds. If the response time is longer than the higher limit, rotate the DELAY LINE ADJUST switch in a counterclockwise direction. If the response time is shorter than lower limit, rotate the DELAY LINE ADJUST switch in a clockwise direction. Each step of the switch changes the delay by 15 millimicroseconds.

*c. Install the radio set (par. 12-30b).***Section IV. CORRECTIVE MAINTENANCE OF THE FORWARD BODY SECTION***b. Installation.*

- (1) Place the ram-pressure probe (5) in the hole in the forward fin assembly (2).
- (2) Install the screws (4), and tighten them.
- (3) Reach through the opening, and connect the reducer (1) to the end of the ram-pressure probe.
- (4) Install the forward body section access door assemblies and tighten the screws to the torque value given in table 15-9.
- (5) Check the alignment for the ram-pressure probe (chapter 10).
- (6) Install the closure (3) on the ram-pressure probe.

12-49. Replacement of the Ram-Pressure Probe (Missiles 13001 and Subsequent)*a. Removal.*

- (1) Prepare the missile as prescribed in table 12-1.



- 1—Hose assembly
- 2—Reducer
- 3—Forward fin assembly
- 4—No. 10-32 x 17/32 brazier-hd screw (4)
- 5—Ram-pressure probe
- 6—Closure

Figure 12-28. Removal and installation of the ram-pressure probe (missiles 13001 and subsequent).

(2) Remove the closure (6, fig. 12-28) from the ram-pressure probe (5).

(3) Remove the screws (4) securing the ram-pressure probe to the forward fin assembly (3).

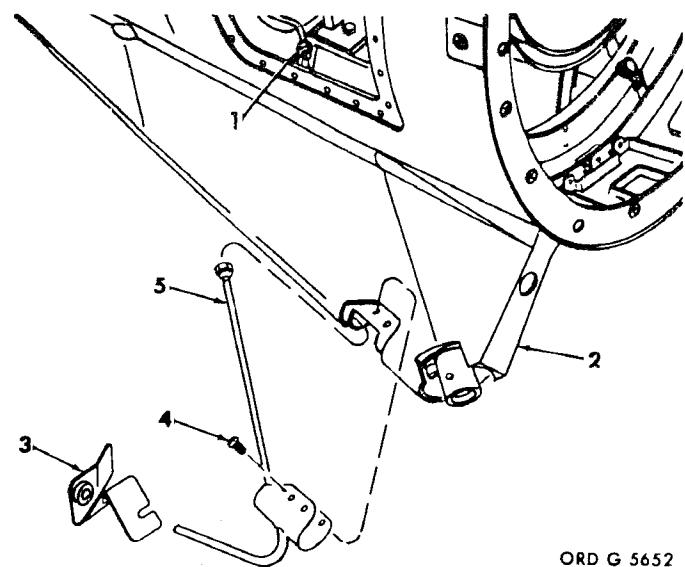
(4) Slowly pull the ram-pressure probe from the forward fin assembly until the hose assembly (1) and the reducer (2) are outside the forward fin assembly.

(5) Disconnect the ram-pressure probe from the reducer.

b. Installation.

(1) Install the ram-pressure probe (5) on the reducer (2).

(2) Push the hose assembly (1) into the forward fin assembly (3) until the ram-pressure probe is in place on the forward fin assembly.



- 1—Reducer
- 2—Forward fin assembly
- 3—Closure
- 4—No. 10-32 x 17/32 brazier-hd screw (4)
- 5—Ram-pressure probe

Figure 12-29. Removal and installation of the ram-pressure probe (missiles 10206 through 11935).

(3) Secure the ram-pressure probe to the forward fin assembly with the screws (4).

(4) Check the alignment of the ram-pressure probe (chapter 10).

(5) Install the closure (6) on the ram-pressure probe.

12-50. Replacement of the Forward Fin Assembly (Missiles 10206 through 11935)

a. Removal.

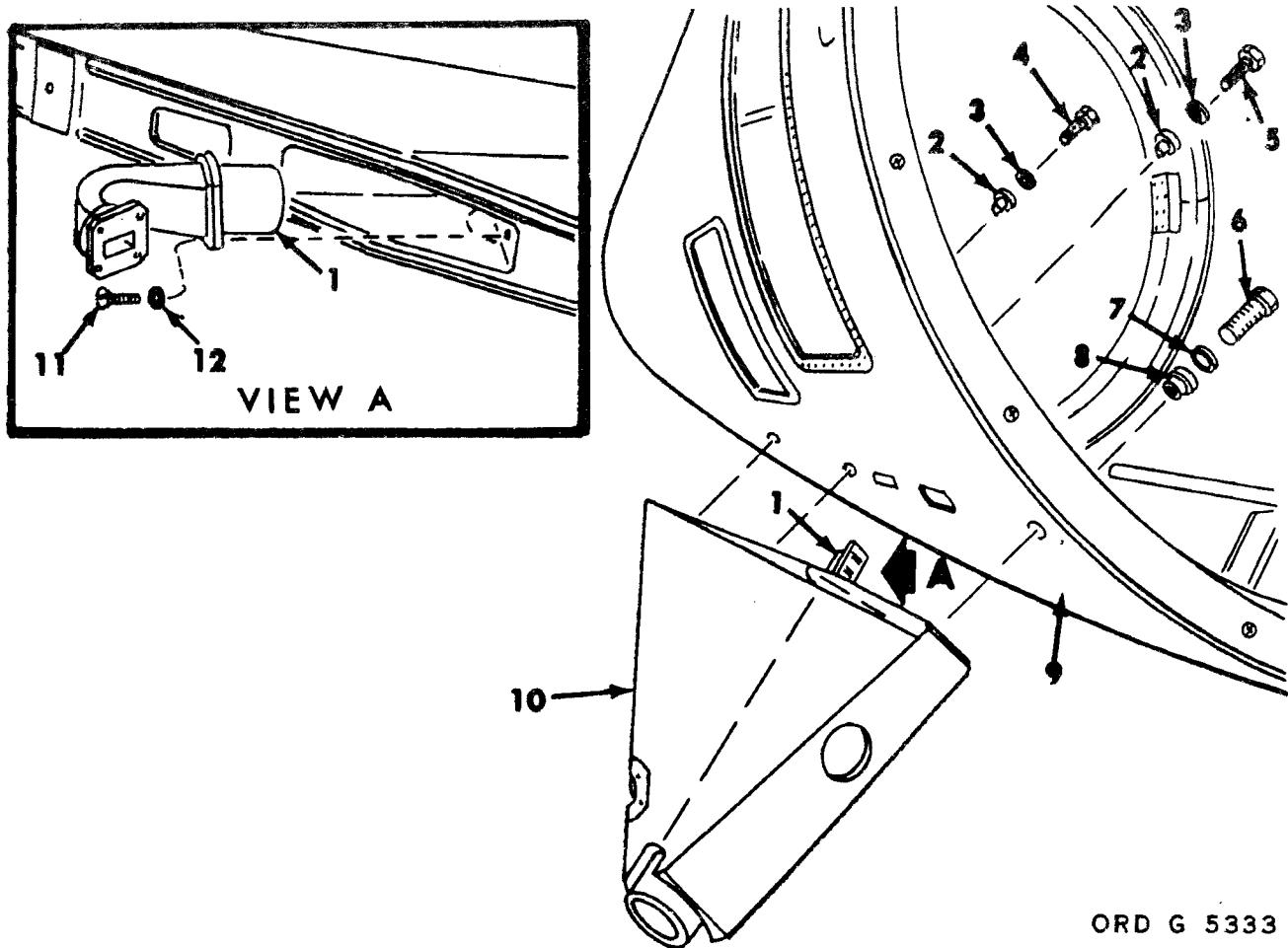
(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder-control group (par. 12-28a).

(3) Remove the waveguide assembly set (fig. 12-13) from the waveguide gooseneck (1, fig. 12-30).

(4) Remove the ram-pressure probe (par. 12-48a).

CAUTION: Support the forward fin assembly while removing the attaching hardware.



1—Waveguide gooseneck
 2—1/4 in-id gasket (missiles 10206 through 10370)
 3—0.265-in-id fl washer
 4—1/4-28 x 21/32 hex-hd bolt (missiles 10206 through 11187) 1/4-28 x 17/32 hex-hd bolt (missiles 11188 through 11935)
 5—1/4-28 x 21/32 hex-hd bolt

6—3/8-24 x 1-5/64 hex-hd bolt
 7—0.390-in-id fl washer
 8—3/8 in-id gasket (missiles 10206 through 10370)
 9—Forward body section
 10—Forward fin assembly (4)
 11—No. 10-32 x 3/4 pan-hd screw (2)
 12—No. 10 lockwasher (2)

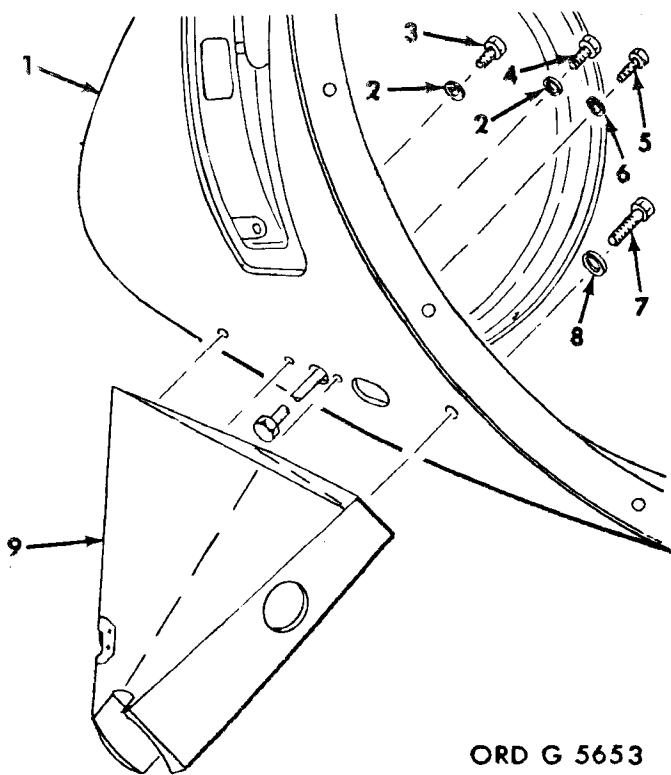
Figure 12-30. Removal and installation of the forward fin assembly (Missiles 10206 through 11935).

- (5) Remove the bolts (4, 5, and 6) flat washers (3 and 7), and gaskets (2 and 8) that secure the forward fin assembly (10) to the forward body section (9).
- (6) Carefully remove the forward fin assembly, sliding the waveguide gooseneck through the opening in the forward body section.
- (7) Remove the two panhead screws (11) and lockwashers (12) that secure the waveguide gooseneck to the forward fin assembly.

b. Installation.

- (1) Install the waveguide gooseneck (1) on the forward fin assembly (10), and secure with the two panhead screws (11) and lockwashers (12).
- (2) Carefully position the forward fin assembly on the forward body section (9), inserting the waveguide gooseneck through the opening in the forward body section.

Note. Discard the three gaskets (2 and 8) on missiles 10206 through 10370, as they are no longer required.



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- 1—Forward body section
- 2—0.265-in-id fl washer
- 3—1/4-28 x 17/32 hex-hd bolt
- 4—1/4-28 x 21/32 hex-hd bolt
- 5—1/4 x 0.906 brazier-hd bolt
- 6—0.255-in-id fl washer
- 7—3/8-24 x 1-5/64 hex-hd bolt
- 8—0.390-in-id fl washer
- 9—Forward fin assembly (4)

Figure 12-31. Removal and installation of the forward fin assembly (missiles 13001 and subsequent).

- (3) Install three flat washers (3 and 7) and hexagon-head bolts (4, 5, and 6) to secure the forward fin assembly to the forward body section. Torque the bolts to the value given in table 15-9.
- (4) Install the ram-pressure probe (par. 12-48b).
- (5) Connect the waveguide assembly set (fig. 12-13) to the waveguide goose-neck (1, fig. 12-30).
- (6) Install the transponder-control group (par. 12-28b).
- (7) Remove the nose hinge assembly (par. 12-5b).

- (8) Rearm the missile, using applicable procedures in chapter 10.

12-51. Replacement of Forward Fin Assembly (Missiles 13001 and Subsequent)

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the transponder control group (par. 12-13a).
- (3) Remove the antenna horn (par. 12-7a).
- (4) Remove the appropriate waveguide assembly (pars. 12-18, 12-19, or 12-20).
- (5) Remove the ram-pressure probe (par. 12-49a).

Caution: Support the forward fin assembly while removing the attaching hardware.

- (6) Remove the three hexagon-head bolts (3, 4, and 7, fig. 12-31), the brazier-head bolt (5), and the four flat washers (2, 6, and 8) that secure the forward fin assembly (9) to the forward body section (1).
- (7) Remove the forward fin assembly.

b. Installation.

- (1) Position the forward fin assembly (9) on the forward body section (1), and secure with the four flat washers (2, 6, and 8), the brazier-head bolt (5), and the three hexagon-head bolts (3, 4, and 7). Tighten the bolts and screw to the torque value given in table 15-9.
- (2) Install the ram-pressure probe (par. 12-49b).

Note. Prior to the installation of the lockwasher (fig. 12-9) and cap screw, spread silastic sealing material 8030-893-4816 under the washer and between the washer and the screw.

- (3) Install the appropriate waveguide assembly (pars. 12-18, 12-19, or 12-20).
- (4) Install the antenna horn (par. 12-7b).
- (5) Install the transponder control group (par. 12-13b).

(6) Remove the nose hinge assembly (par. 12-5b).

(7) Rearm the missile, using applicable procedures in chapter 10.

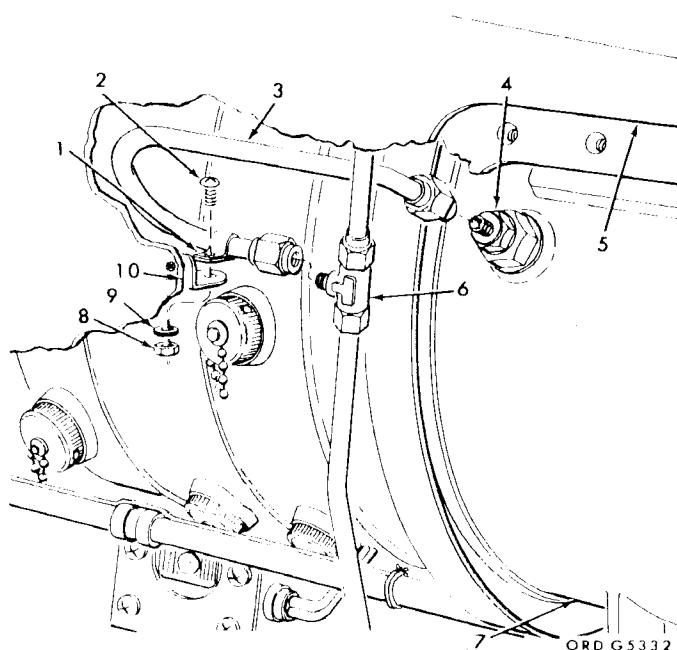
12-52. Replacement of Stagnation Tube Assembly (Missiles 10206 through 11935)

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward body section access door assemblies.

(3) Remove the hexagon nut (8, fig. 12-32), flat washer (9), and truss-head screw (2) that secure the clamp (1) to the clip (10); remove the clamp from the stagnation tube assembly (3).



- 1—Clamp AN742D3
- 2—No. 8-32 x 1/2 truss-hd screw
- 3—Stagnation tube assembly
- 4—Stagnation tube fitting
- 5—Forward body section
- 6—Tee
- 7—Transponder control group
- 8—No. 8-32 hex-nut
- 9—0.174-in-id fl washer
- 10—Clip

Figure 12-32. Removal and installation of the stagnation tube assembly (missiles 10206 through 11935).

(4) Disconnect the stagnation tube assembly from the stagnation tube fitting (4) on the transponder control group (7) and the tee (6); remove the stagnation tube assembly.

(5) Install protective caps on the stagnation tube fitting and the tee.

b. Installation.

(1) Remove the protective caps from the stagnation tube fitting (4) and the tee (6).

(2) Connect the stagnation tube assembly (3) to the stagnation tube fitting and the tee.

(3) Install the clamp (1) on the stagnation tube assembly, and secure the clamp to the clip (10) with the truss-head screw (2), flat washer (9), and hexagon nut (8).

(4) Install the forward body section access door assemblies (par. 12-47.)

12-53. Replacement of Stagnation Tube Assembly (Missile 13001 and Subsequent)

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder control group (par. 12-13a).

(3) Remove the flathead screw (6, fig. 12-33), flat washer (5), lockwasher (4), and hexagon nut (3) that secure the clamp (9) to the stagnation tube assembly (8) and the skin of the forward body section (7); remove the clamp.

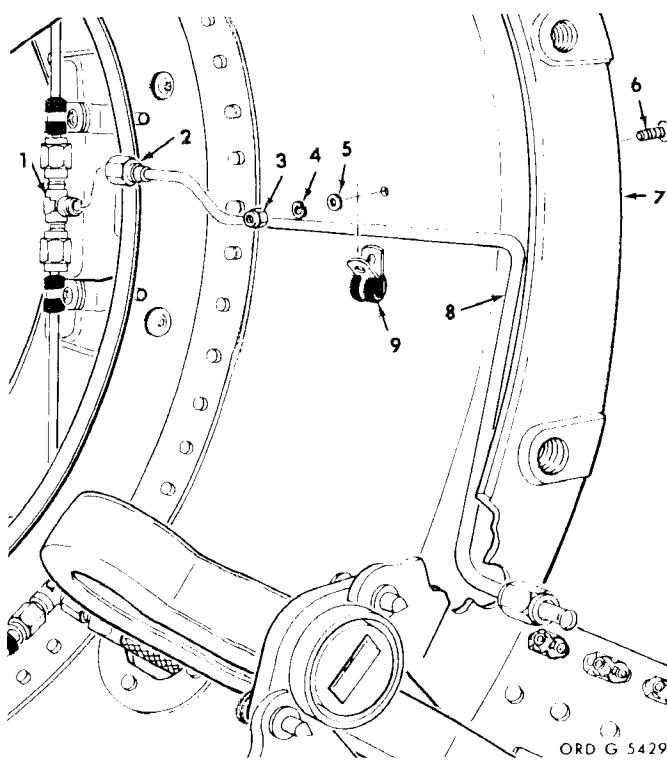
(4) Disconnect the coupling nut (2) securing the stagnation tube assembly to the tee (1); remove the stagnation tube assembly.

b. Installation.

(1) Position the stagnation tube assembly (8) within the forward body section (7).

(2) Secure the stagnation tube assembly to the tee (1) by tightening the coupling nut (2).

(3) Secure the stagnation tube assembly to the skin of the forward body section with the



- 1—Tee
- 2—Coupling nut
- 3—No. 8-32 hex nut
- 4—No. 8 lockwasher
- 5—0.174 = in = id
- 6—No. 8-32 x 1/2 fl-hd screw
- 7—Forward body section
- 8—Stagnation tube assembly
- 9—Clamp

Figure 12-33. Removal and installation of the stagnation tube assembly (missiles 13001 and subsequent).

clamp (9), flathead screw (6), flat washer (5), lockwasher (4), and hexagon nut (3).

(4) Install the transponder control group (par. 12-13b).

(5) Remove the nose hinge assembly (par. 12-5b).

(6) Rerarm the missile, using applicable procedure in chapter 10.

12-54. Replacement of Nose Tip

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the nose tip by turning counter-clockwise with a strap wrench.

b. Installation. Install the nose tip by turning clockwise handtight.

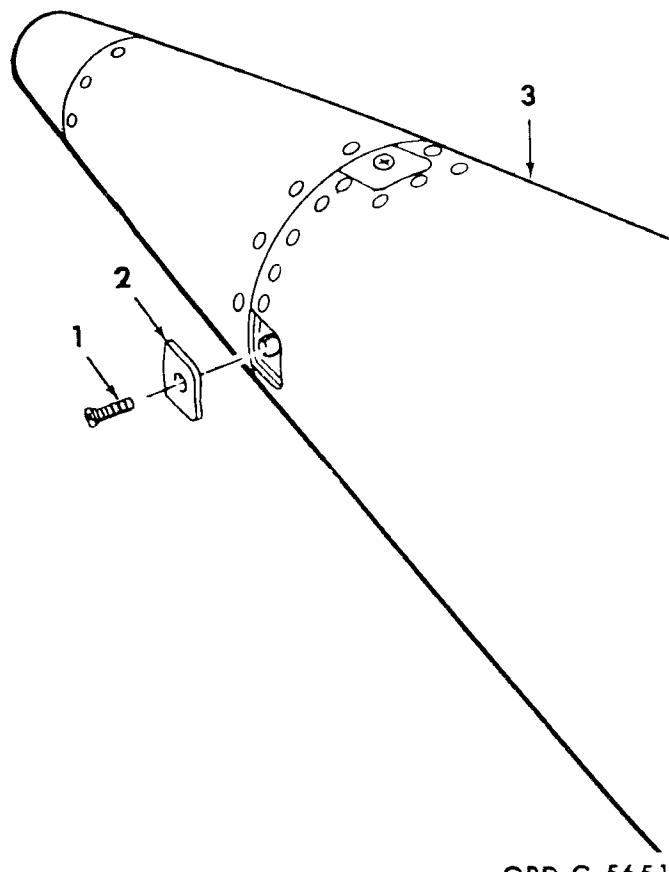
12-55. Replacement of Boltwell Covers

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the four flat-head screws (1, fig. 12-34 or 3, fig. 12-35) and (2, fig. 12-34 or 2, fig. 12-35) boltwell covers from the forward body section (3, fig. 12-34 or 1, fig. 12-35).

(3) Remove the six flathead screws (10, fig. 7-8) and the boltwell covers (11) from the forward body section (6).



- 1—No. 10-32 x 1-3/16 fl-hd screw (4)
- 2—Boltwell cover (4)
- 3—Forward body section

Figure 12-34. Removal and installation of the boltwell covers (missiles 10206 through 11187).

1—Forward body section
 2—Boltwell cover
 3—No. 10-32 x 1-5/32 fl-hd screw

Figure 12-35—Continued.

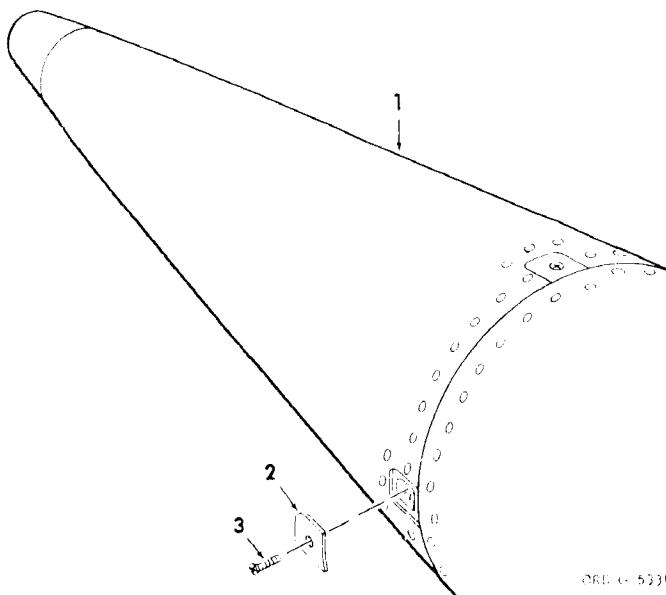


Figure 12-35. Removal and installation of the boltwell covers (missiles 11188 through 11935 and 13001 and subsequent).

Section V. CORRECTIVE MAINTENANCE OF WARHEAD BODY SECTION

Warning: The warhead body section contains explosives. All applicable safety regulations will be enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

Warning: Handling operations of the warhead body section will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials must be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

Warning: Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical

b. Installation.

- (1) Position the four boltwell covers (2, fig. 12-34 or 2, fig. 12-35) on the forward body section (3, fig. 12-34 or 1, fig. 12-35), and secure with the four flathead screws (1, fig. 12-34 or 3, fig. 12-35). Tighten the screws to the torque value given in table 15-9.
- (2) Position the six boltwell covers (11, fig. 7-8) on the forward body section (6), and secure with the six flathead screws (10). Tighten the screws to the torque value given in table 15-9.

currents. A ground strap with a maximum ground resistance of 20 ohms must be attached from the component to a grounding stake. A CO₂ fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

12-56. Replacement of Warhead Body Section Access Cover Plates

Note. The procedures prescribed in *a* and *b* below are typical for both warhead body section access cover plates.

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Loosen the captive fasteners (fig. 7-11) that secure the warhead body section access cover plate to the warhead body section.
- (3) Remove the access cover plate.

b. Installation. Position the warhead body section access cover plate on the warhead body section, and secure with the captive fasteners.

12-57. Replacement of Fail-Safe Control Bracket and Insulation Blanket

a. Removal.

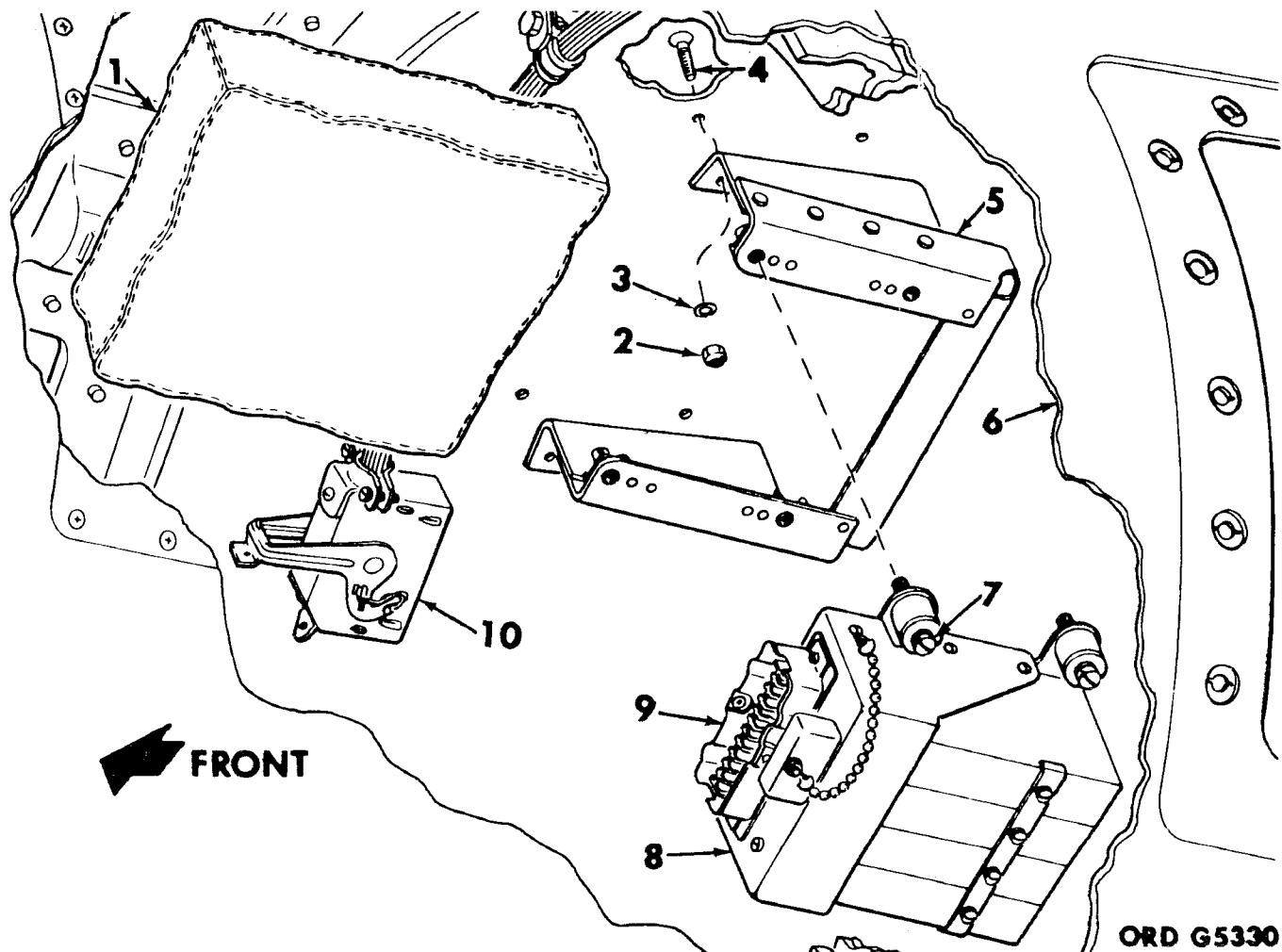
- (1) Prepare the missile as prescribed in table 12-1.
- (2) Cut the safety wire (1, fig. 7-6) that secures the latch.
- (3) Disconnect connector P502 (10, fig. 12-36) from connector J1 (9) on the fail-safe control (8).
- (4) Release the captive screws (7), and remove the fail-safe control.

(5) Remove the insulation blanket (1) from the fail-safe control bracket (5).

(6) Remove the hexagon nuts (2), flat washers (3), and flathead screws (4) that secure the fail-safe control bracket to the warhead body section (6); remove the bracket.

b. Installation.

- (1) Secure the fail-safe control bracket (5) to the warhead body section (6) with the flathead screws (4), flat washers (3), and hexagon nuts (2).



1—Insulation blanket
 2—No. 8-32 hex nut (4)
 3—0.174-in-id fl washer (4)
 4—No. 8-32 x 1/2 fl-hd screw (4)

5—Fail-safe control bracket
 6—Warhead body section
 7—Captive screw (4)
 8—Fail-safe control

9—Connector J1
 10—Connector P502

Figure 12-36. Removal and installation of the fail-safe control and insulation blanket.

- (2) Position the insulation blanket (1) in the fail-safe control bracket (5).
- (3) Secure the fail-safe control (8) to the bracket with the captive screws (7).
- (4) Connect fail-safe wiring harness connector P502 (10) to connector J1 (9), and secure by putting the latch (2, fig. 7-6) of connector P502 on the stud of connector J1 (5). Lock with 0.032-inch diameter steel safety wire (1).
- (5) Remove the nose hinge assembly (par. 12-5b).
- (6) Rerarm the missile, using applicable procedures in chapter 10.

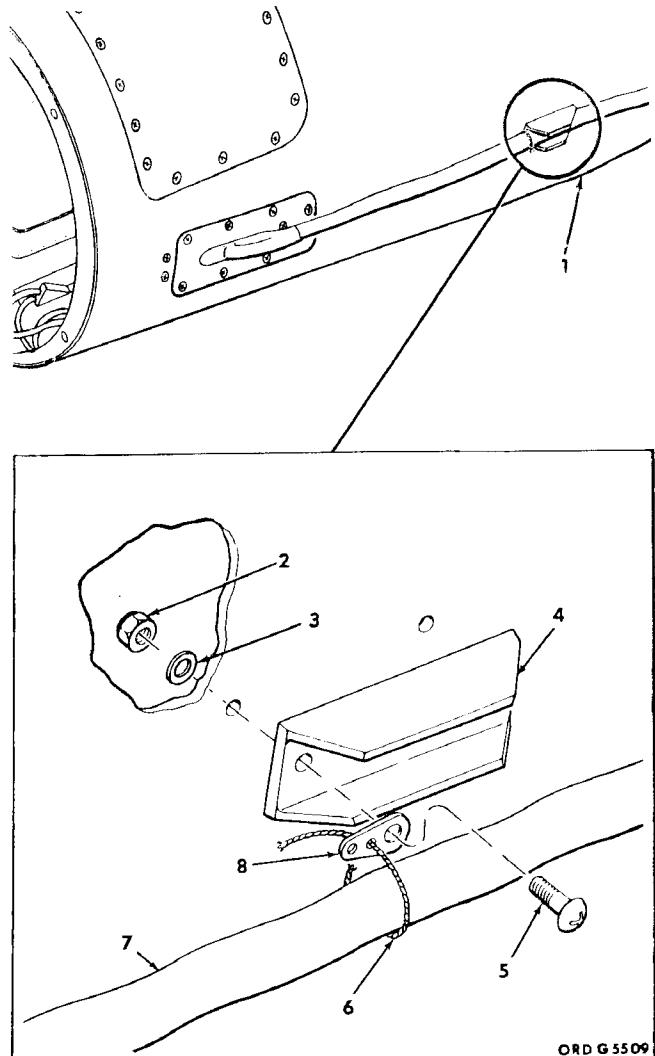
12-58. Replacement of Missile Fin Bracket

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward main fin (par. 11-16).
- (3) Remove the hexagon nut (2, fig. 12-37), flat washers (3), and brazier-head screws (5) that secure the missile fin bracket (4) to the warhead body section (1) (on the fin bracket for fin 3 or 4) also remove the string tie (6) securing the wiring harness (7) and the spacer (8); and remove the bracket.

b. Installation.

- (1) Secure each missile fin bracket (4) to the warhead body section (1) with the brazier-head screws (5), flat washers (3), and hexagon nuts (2) (on the fin bracket for fin 3 or 4; also install the spacer (8)).
- (2) Place the wiring harness (7) on the fin bracket (4), and install the string tie (6).
- (3) Install the forward main fin (par. 7-5).
- (4) Remove the nose hinge assembly (par. 12-5b).
- (5) Rerarm the missile using applicable procedures in chapter 10.



1—Warhead body section
 2—1/4-28 hex nut (2)
 3—0.265-in-id fl washer (2)
 4—Missile fin bracket (4)
 5—1/4-28 x 27/32 brazier-head screw (2)
 6—String tie (fins 3 and 4 only)
 7—Wiring harness (fins 3 and 4 only)
 8—Spacer (fins 3 and 4 only)

Figure 12-37. Removal and installation of the missile fin brackets.

12-59. Replacement of Safety-and-Arming Device Clip and Clip Bracket

a. Removal.

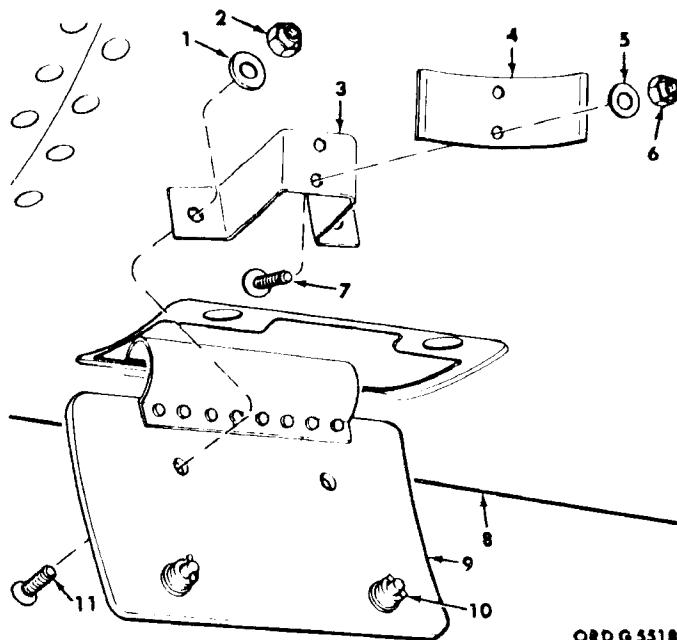
- (1) Prepare the missile as prescribed in table 12-1.
- (2) Release the captive fasteners (10, fig. 12-38) on the ARMING

MECHANISM access cover plate (9); open the cover plate.

- (3) Remove the hexagon nuts (2), flat washers (1), and flathead screws (11), that secure the clip bracket (3) to the access cover plate (9).
- (4) Remove the hexagon nuts (6), flat washers (5), and roundhead screws (7) that secure the safety-and-arming device clip (4) to the bracket.

b. Installation.

- (1) Attach the safety-and-arming device clip (4) to the clip bracket (3) with the roundhead screws (7), flat washers (5), and hexagon nuts (6).
- (2) Attach the clip bracket to the ARMING MECHANISM access cover plate (9) with two flathead screws



- 1—No. 10 fl-washer (2)
- 2—No. 10-32 hex nut (2)
- 3—Clip bracket
- 4—Safety and arming device clip
- 5—0.174 in-id fl washer (2)
- 6—No. 8-32 hex nut (2)
- 7—No. 8-32 x 3/8 rd-hd screw (2)
- 8—Warhead body section
- 9—ARMING MECHANISM access cover plate
- 10—Captive fastener (2)
- 11—No. 10-32 x 21/32 fl-hd screw (2)

Figure 12-38. Removal and installation of the safety-and-arming device clip and clip bracket.

(11), flat washers (1), and hexagon nuts (2).

- (3) Rerarm the missile, using applicable procedures in chapter 10.

12-60. Replacement of Warhead Body Section Boltwell Covers

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward main fins (par. 11-16).

Note. Perform (3) through (5) below for warhead body sections equipped with 2- or 3-piece boltwell covers.

- (3) Remove the four flathead screws (5, fig. 6-4) that secure the boltwell covers (4) to the rear of the warhead body section (7).
- (4) Remove the two flathead screws (9) and boltwell cover nuts (10) that secure the three boltwell covers (12) together; remove the boltwell covers.
- (5) Remove the two flathead screws (3, fig. 12-39) and boltwell cover nuts (2) that secure the two forward warhead section boltwell covers together (1 and 4); remove the boltwell covers.

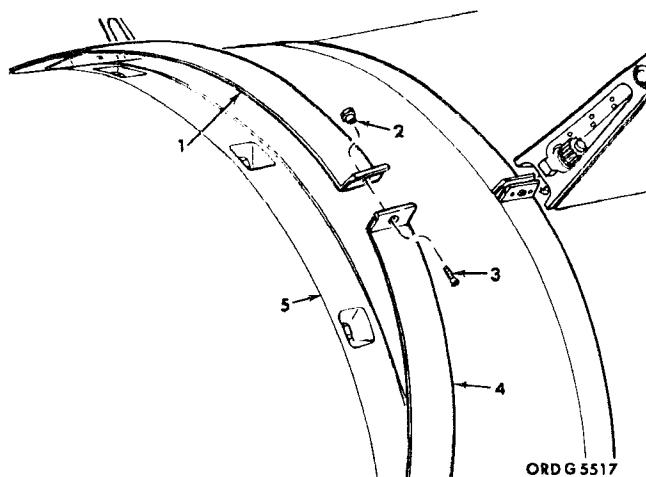
Note. Perform (6) and (7) below, for warhead body sections equipped with 1-piece boltwell covers.

- (6) Remove the flathead screw (9, fig. 6-4) and boltwell cover nut (10) that secure the boltwell cover (12) together at the rear of the warhead body section (11); remove the boltwell cover.
- (7) Remove the flathead screw (3, fig. 12-39) and the boltwell cover nut (2) that secure the forward warhead section boltwell cover (1) together; remove the boltwell cover.

b. Installation.

Note. Perform (1) through (3) below for warhead body sections equipped with two-or three-piece boltwell covers.

- (1) Position the two forward warhead section boltwell covers (1 and 4) on the warhead body section (5), and as-



- 1—Forward warhead section boltwell cover (warhead body sections 11001 through 15744)
- 2—No. 10-32 x 7/32 boltwell cover nut (2) (warhead body sections 11001 through 15774) or (1) (warhead body sections 15745 and subsequent)
- 3—No. 10-32 x 17/32 fl-hd screw (2) (warhead body section 11001 through 15774) or (1) (warhead body section 15745 and subsequent)
- 4—Forward warhead section boltwell cover 8521081 (warhead body sections 11001 through 15744) or 9019865 (warhead body sections 15745 and subsequent)
- 5—Warhead body section

Figure 12-39. Removal and installation of the forward warhead section boltwell covers.

semble with the two flathead screws (3) and boltwell cover nuts (2).

Section VI. CORRECTIVE MAINTENANCE OF MISSILE MOTOR SECTION

12-61. Replacement of Missile Motor Section Access Doors

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the missile motor section access door (par. 3-8).

b. Installation. Install the missile motor section access doors (par. 5-10b).

12-62. Replacement of Special Shape Insulation (Missiles 10206 through 11935 and 13001 through 17055)

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Position three boltwell covers (12 and 8, fig. 6-4) at the rear of the warhead body section (11), and assemble loosely with the two flathead screws (9) and boltwell cover nuts (10).

- (3) Secure the assembled boltwell covers to the warhead body section with four flathead screws (5).

Note. Perform (4) and (5) below, for warhead body sections equipped with one-piece boltwell covers.

- (4) Position the forward warhead section boltwell cover (4, fig. 12-39) on the warhead body section (5), and secure the boltwell cover together with the flathead screw (3) and boltwell cover nut (2).
- (5) Position the boltwell cover (12, fig. 6-4) on the rear of the warhead body section (11), and secure the boltwell cover together with the flathead screw (9) and boltwell cover nut (10).
- (6) Tighten the flathead screws to the torque value given in table 15-9.
- (7) Install the forward main fins (par. 7-5).
- (8) Remove the nose hinge assembly (par. 12-5b).
- (9) Rerarm the missile, using applicable procedures in chapter 10.

Note. Observe the safety precautions prescribed in paragraph 12-3.

- (2) Remove the forward body section (pars. 11-14 and 11-15).
- (3) Remove the forward main fins, and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).
- (4) Remove the warhead body section (pars. 11-20 and 11-21).
- (5) Remove the special shape insulation by turning counterclockwise.

b. Installation.

- (1) Position the special shape insulation on the motor head heater and turn clockwise to lock in position.

- (2) Install the warhead body section (par. 6-3).
- (3) Complete the final assembly and preparation of the warhead body section and the forward body section (chapter 7).
- (4) Reactivate the missile using applicable procedures in chapter 10.

12-63. Replacement of Motor Head Heater

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

Note. Observe the safety requirements prescribed in paragraph 12-3.

- (2) Remove the forward body section (pars. 11-14 and 11-15).
- (3) Remove the forward main fins, and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).
- (4) Remove the warhead body section (pars. 11-20 and 11-21).
- (5) Disconnect connector P171 (3, fig. 5-12) from connector J171 (2).
- (6) Remove the motor head heater (4) by removing the four hexagon-head bolts (5) and four nonmetallic washers (6).

b. Installation.

- (1) Place the motor head heater (4) in position on the missile rocket motor subassembly (1).
- (2) Install four nonmetallic washers (6) and hexagon-head bolts (5); tighten the bolts.
- (3) Connect connector P171 (3) to connector J171 (2). Make certain that the entire width of the orange band

on connector P171 is visible after the connection is made.

(4) Install the warhead body section (par. 6-3).

(5) Complete the assembly and preparation of the warhead body section and the forward body section (chapter 7).

(6) Reactivate the missile, using applicable procedures in chapter 10.

12-64. Replacement of Missile Rocket Motor Subassembly

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward body section (pars. 11-14 and 11-15).
- (3) Remove the forward main fins and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).
- (4) Remove the warhead body section (pars. 11-20 through 11-21).
- (5) Remove the missile rocket motor sub-assembly (pars. 11-23 and 11-24) for a permanent-type installation.

b. Installation.

- (1) Install the missile rocket motor sub-assembly (chapter 5, sections II and III).
- (2) Install the warhead body section (par 6-3).
- (3) Complete the preparation of the warhead body section and the forward body section (chapter 7).
- (4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

Section VII. CORRECTIVE MAINTENANCE OF THE EQUIPMENT

SECTION

12-65. Replacement of Propulsion Arming Lanyard Components

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

Caution: Check that safety-and-arming switch S31, (fig. 5-13) is in a safe condition as indicated by a green field visible through the inspection window.

(2) Remove the hexagon nut (3, fig. 10-6) and flat washers (2) securing the lanyard assembly (5) to the lanyard mounting bracket (4).

CAUTION: Avoid rotating the trigger operating plug (14) to avoid shearing the aluminum rivet (13). Shearing this rivet may activate the battery.

(3) Remove the lanyard assembly (5) from the trigger operating plug in the lanyard receptacle (15).

(4) Install the shipping plug (11) in the trigger operating plug in the lanyard receptacle. Apply approximately 5 turns with finger pressure only.

b. Disassembly. Remove the two cotter pins (8), flat washers (9), and flathead pins (6) that secure the eyebolts (10) to the lanyard (7).

c. Assembly. Secure each eyebolt (10) to the lanyard (7) with a flathead pin (6), flat washer (9), and cotter pin (8).

d. Installation. Install the propulsion arming lanyard (par. 10-2).

12-66. Replacement of Battery Box Cover (Missiles 10206 through 11935 and 13001 through 13683)

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Remove the missile battery box from the equipment section.

(4) Remove the battery box cover from the battery tray and disconnect the heater assembly leads from the battery box cover.

CAUTION: Care must be taken to insure that the red (positive) lead (7, fig. 10-1) and the black (negative) lead (8) terminals of the guidance set storage battery (11) do not touch each other as they will fuse together. The terminals should be covered with rubber terminal protector tips or tape immediately after disconnecting.

NOTE. Perform (5) and (6) below for missiles 10206 through 10607 or (7) and (8) for missiles 10608 through 11935 and 13001 through 13683.

(5) Remove the hexagon nut (19), lockwasher (18), and flatwasher (17) that secure the red (positive) lead (7) of the guidance set storage battery (11) to terminal 1 (5) of board TB30 (20).

(6) Remove the hexagon nut, lockwasher, and flat washer that secure the black (negative) lead (8) of the guidance set storage battery to terminal 2 (6) of terminal board TB 30 (20).

(7) Remove the hexagon nut (3), internal-teeth lockwasher (2), and flat washer (1) that secure the red (positive lead) (7) of the guidance set storage battery (11) to terminal 2 of terminal board TB536 (26).

(8) Remove the hexagon nut, internal-teeth lockwasher, and flat washer that secure the black (negative) lead (8) of the guidance set storage battery to terminal No. 1 (5) of terminal board TB 356.

(9) Remove the battery box cover (24).

b. Installation.

(1) Connect the heater assembly and the guidance set storage battery (par. 10-1e (20) through (28)).

CAUTION: Care should be exercised to prevent damage to wires while performing (2) below.

(2) Install the missile battery box (par. 10-1e (29) through (33)).

c. Rearming the missile. Use applicable procedures in chapter 10.

12-67. Replacement of Guidance Set Storage Battery and Heater Assembly (Missiles 10206 through 11935 and 13001 through 13683)

CAUTION: Before disconnecting or connecting the guidance set storage battery, make certain that the section control-indicator controls and switches are in the initial operating condition, the MISSILE HEAT switch is set to OFF, connectors P1X and P72A are installed in the dummy connectors, and connectors P104A and P105A are properly installed in connectors J104 and J105A respectively.

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Remove the missile battery box from the equipment section.

(4) Remove the battery box cover, and disconnect the heater assembly leads from the battery box cover (par. 10-1e (7) through (15)).

(5) Disconnect the storage battery (par. 12-66a (5) through (9)).

(6) Remove the spacers (10, fig. 10-1).

(7) Remove the two dummy batteries (9).

(8) Remove the guidance set storage battery (11).

(9) Remove the heater assembly (12) from the battery tray (13).

b. Installation.

(1) Install the heater assembly and storage battery (par. 10-1e and f).

(2) Install the access cover plate and tighten the screws to the torque value given in table 15-9.

c. Rearing the missile. Use applicable procedures in Chapter 10.

12-68. Replacement of Guidance Set Squib Battery (Missiles 13684 and Subsequent)

CAUTION: Before disconnecting or connecting the guidance set squib battery, make certain that the section control-indicator controls and switches are in the initial operating condition, the MISSILE HEAT switch is set to OFF, connectors P1X and P72A are installed in the dummy connectors, and connectors P104A and P105A are properly installed in connectors J104A and J105A respectively.

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Disconnect connector P541 (2, fig. 10-3) from the connector on the guidance set squib battery (7).

(4) Release the hose clamp (5) and remove the battery drain hose (3) from the battery vent (6).

(5) Remove the four fillister-head screws (8) and flat washers (9) that secure the guidance set squib battery to the missile battery rack (10), and remove the battery.

b. Installation.

NOTE. Inadvertent activation of the installed battery may cause damage to the battery squid activating circuit. To assure serviceability of the circuit, the following checks must be made.

CAUTION: Insure that all BA-472/U batteries have been removed from the missile before performing steps (1) through (11) below.

(1) Disconnect connector P540 from connector J540 on the missile distribution box.

NOTE. Perform steps (2) through (6) below for missiles 13684 through 16684, or steps (7) through (11) below for missiles 16685 and subsequent.

(2) Connect an ohmmeter between the following pins:

(a) Pin N of P540 and pin I of P541.

(b) Pin N of P540 and pin I of P542.

(c) Pin N of P540 and pin I of P543.

(3) The ohmmeter indication should be 30 to 50 ohms.

(4) Connect an ohmmeter between the following pins and ground:

(a) Pin I of P541.

(b) Pin I of P542.

(c) Pin I of P543.

(5) The ohmmeter should indicate an open circuit.

(6) Connect an ohmmeter between pins N and U of J540. The ohmmeter should indicate continuity.

NOTE. For missiles 16685 and subsequent, inspect the component mounting panel 4 to determine if transformers 8109-HS436 or 80223-DS771 have been used.

(7) Connect an ohmmeter between pins J and I of P541. The meter should indicate continuity (less than 3 ohms).

(8) Connect an ohmmeter between pins J and I of P542. The meter should indicate continuity (less than 3 ohms).

(9) Connect an ohmmeter between pins J and I of P543. The meter should indicate continuity (less than 3 ohms).

(10) For component mounting panels equipped with transformer 81095-HS436, connect an ohmmeter between pins N and U of P540. The meter should indicate between 22 and 32 ohms.

(10.1) Connect an ohmmeter between the following pins and ground:

- (a) Pin I of P541.
- (b) Pin I of P542.
- (c) Pin I of P543.

(10.2) The ohmmeter should indicate an open circuit.

(11) For component mounting panels equipped with transformers 80223-DS771, connect an ohmmeter between pins N and U of P540. The meter should indicate between 8 and 16 ohms.

(12) Perform the squib battery test (par. 7-7).

(13) Place the guidance set squib battery (7, fig. 10-3) on the missile battery rack (10), and secure with the flat washers (9) and fillister-head screws (8).

(14) Place the battery drain hose (3) on the battery vent (6); secure with the hose clamp (5).

(15) Connect connector P540 to connector J540 on the missile distribution box.

CAUTION: The shorting spring or shorting connector across the squib circuit pins of the connector on the guidance set squib battery must be removed to perform step (16) below.

(16) Connect connector P541 (2) to the connector on the guidance set squib battery.

(17) Install the equipment section access cover plate on the left side of the missile and tighten the screws to the torque value given in table 15-9.

(18) Rerarm the missile, using the applicable procedures in chapter 10.

Section VIII. CORRECTIVE MAINTENANCE OF THE ACCESSORY POWER SUPPLY (APS) AND THE HYDRAULIC PUMPING UNIT (HPU)

12-69. Replacement of the Accessory Power Supply (APS)

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate.

WARNING: ET_hO liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Care should be exercised to keep the ET_hO from dropping on or into the shoes or clothing. Should the ET_hO become confined between the skin and clothing, remove the clothing, and immediately wash the skin with soap and water; allow the clothing to air-dry for several hours. Dispose of the contaminated shoes. Should ET_hO get into the eyes, flush the eyes with water, and report to the proper authorities.

WARNING: Approved respirator protectors (self-contained breathing apparatus) must be worn

where there is a possibility of harmful concentrations of ET_hO. The maximum allowable concentration of ET_hO is 50 parts per million parts of air for an 8-hour exposure. Where high vapor concentrations exist, and when working in confined unventilated areas, approved type self-contained breathing apparatus must be worn.

WARNING: Clear the area of all non-participating personnel and flammable materials. Position two manned CO₂ fire extinguishers within 4 feet of the APS, and prohibit smoking within 60 feet. The operating personnel must wear goggles or face masks, rubber gloves and a rubber apron.

(3) Depressurize the APS (par. 11-30).

(4) Loosen the APS hydraulic pressure tube coupling nut (view B, fig. 12-40), and detach the APS hydraulic pressure tube from the actuator tube cross.

(7) Loosen the APS hydraulic return tube coupling nut (view C), and detach the APS hydraulic return tube from the APS low-pressure fitting.

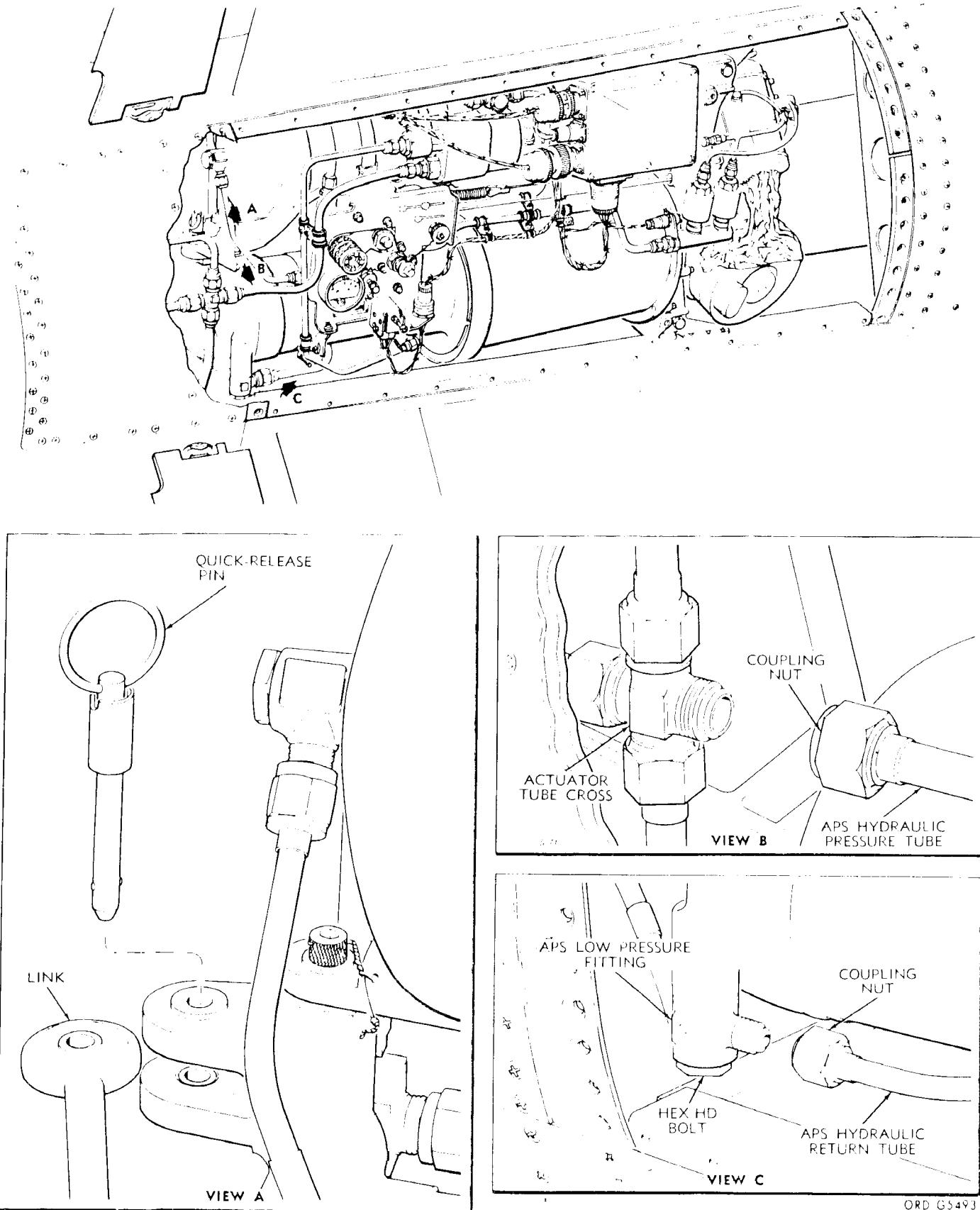


Figure 12-40. Removal and installation of the rear attachment for the accessory power supply.

(8) Loosen the hexagon-head bolt on the APS low-pressure fitting, and rotate the fitting approximately 90 degrees toward the outside of the missile to prevent interference during the APS removal.

(9) Disconnect the APS wiring harness connectors P143 and P144 (view A, fig. 12-41) from APS connectors J3 and J1 respectively.

(10) Remove the quick-release pin (view A, fig. 12-40). Pivot the link toward the rear of the equipment section to prevent interference when the APS is removed.

CAUTION: The weight of the APS (approximately 90 pounds) should be supported while performing (11) below to prevent binding of the bolts.

(11) Remove the two hexagon-head bolts (views B and C, fig. 12-41) flat washers, and hexagon nuts, and allow the APS to rest on the bottom of the equipment section access opening.

(12) Move the APS approximately $\frac{1}{4}$ inch to the rear of the equipment section to insure clearance from the structure on removal.

(13) Move the forward end of the APS partially out of the equipment section (fig. 12-42). Tip the APS slightly back into the section, and carefully remove it from the equipment section.

b. Installation.

(1) Place the APS in the equipment section (fig. 12-42).

(2) Pivot the link (view A, fig. 12-40) to position on the APS, and insert the quick-release pin.

(3) Connect the APS hydraulic pressure tube (view B) to the actuator tube cross. Tighten the coupling nut to a torque value of 300 pound-inches.

(4) Install the hexagon-head bolts (6 and 10, fig. 12-41), flat washers (8 and 12), and hexagon nuts (9 and 13) to secure the APS to the upper bracket (11) and the lower bracket (7). Tighten the hexagon nuts to a torque value of 120 pound-inches.

(5) Loosen the hexagon-head bolt (view C, fig. 12-40), and rotate the APS low-pressure fitting approximately 90 degrees to the position shown in view C.

(6) Connect the APS hydraulic return tube (view C) to the APS low-pressure fitting. Tighten the coupling nut to a torque value of 110 pound-inches.

(7) Connect APS wiring harness connectors P143 and P144 (3 and 2 fig. 12-41) to APS connectors J3 and J1 (4 and 5) respectively.

(8) Perform the air, oil, and fuel servicing of the APS (tables 4-1, 4-2, and section IV, chapter 4).

(9) Install the right equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(10) Rerarm the missile, using the applicable procedures in chapter 10.

12-70. Replacement of the Hydraulic Pumping Unit (HPU)

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate (2, fig. 3-21).

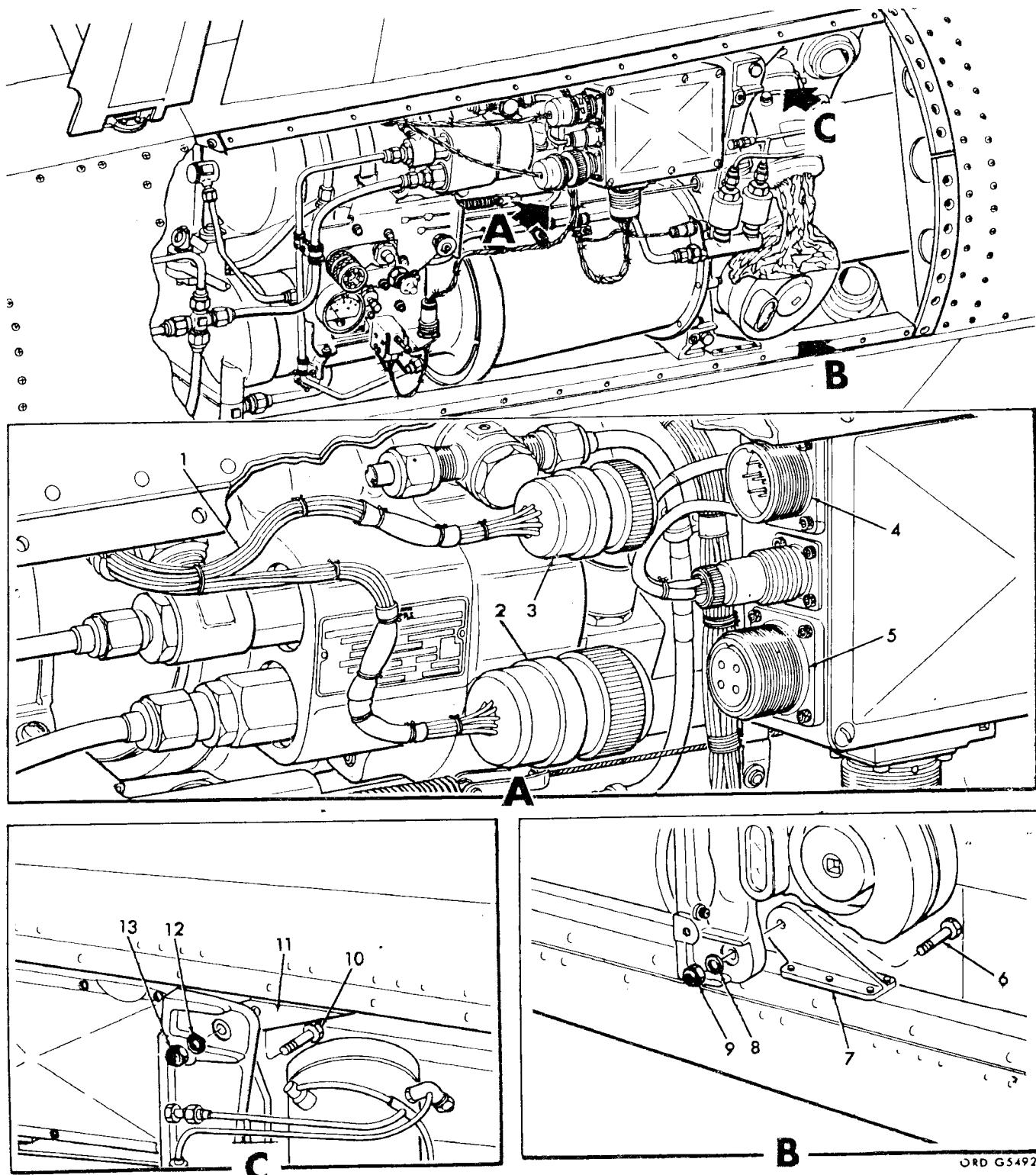
(3) Disconnect connector P544 (2, fig. 10-4) from connector J544 (3) and install the shorting dummy connector on J544.

(4) Depressurize the HPU (par. 11-30).

(5) Pull back the cable nipple (6, fig. 12-43); remove the hexagon nut (9), lockwasher (8), and flat washer (7) securing the positive lead (10) to the positive terminal stud (11); and remove the lead.

(6) Repeat step (5) above to disconnect the negative lead (5).

(7) Disconnect connectors P143 (3) and P144 (1) from connectors J143 (4) and J144 (2), respectively.



A—Connections

1—APS wiring harness
2—Connector P144

3—Connector P143

4—Connector J3
5—Connector J1

Figure 12-41. Removal and installation of the forward attachments for the accessory power supply.

B—Lower bracket
 6—5/16-24 x 1-15/32 hex-hd bolt AN5-13A
 7—Lower bracket
 8—5/16-inch-id fl washer
 9—5/16-24 hex. nut

C—Upper bracket
 10—5/16-24 x 1-15/32 hex-hd bolt
 11—Upper bracket
 12—5/16-inch-id fl washer
 13—5/16-24 hex nut

Figure 12-41 — Continued.

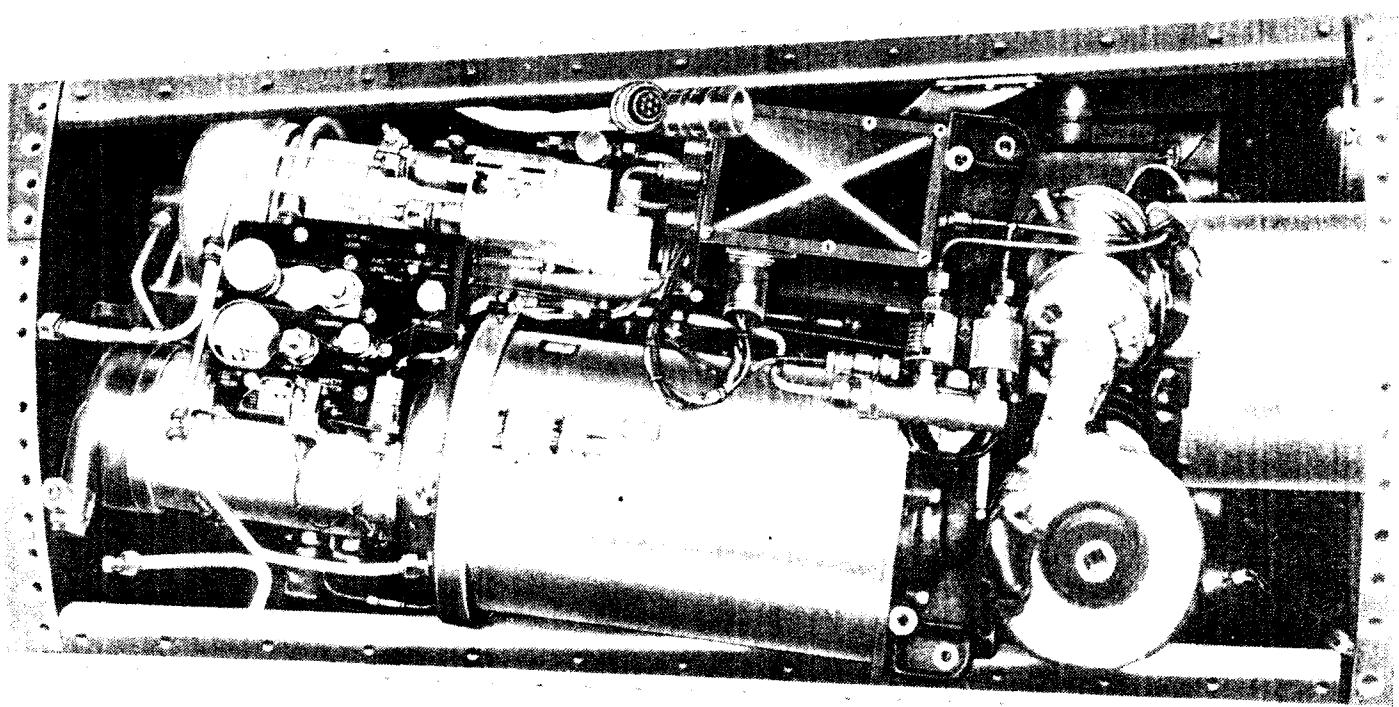


Figure 12-42. Removal and installation of the accessory power supply.

CAUTION: As each tube assembly is disconnected, immediately seal the tube assembly with a clean protective cap.

(8) Remove the clamps (7 and 11, fig. 12-44) that secure the dump tube assembly (5), and return tube assembly (6).

(9) Loosen the coupling nut (3), and detach the dump tube assembly from the manifold assembly (4).

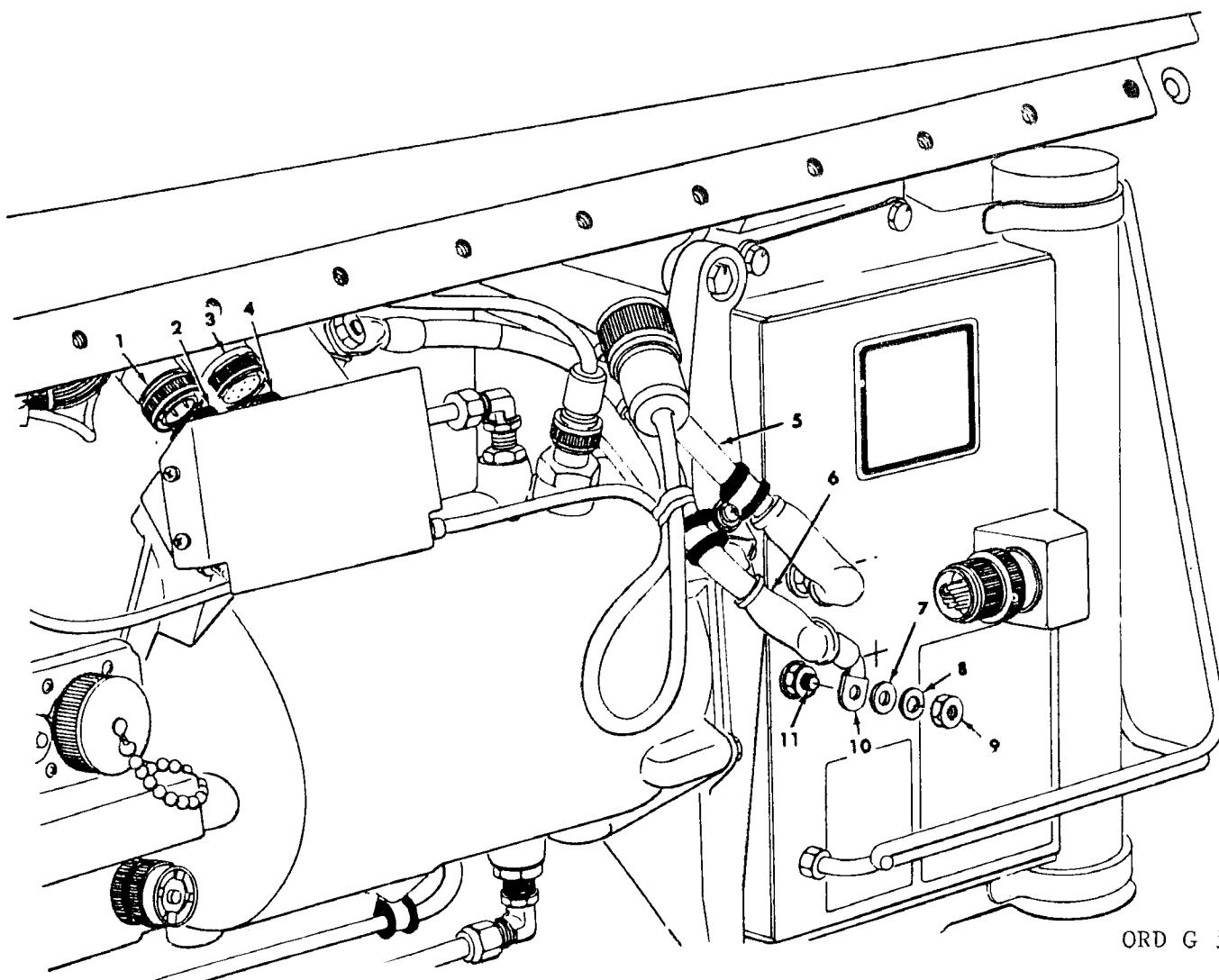
(10) Loosen the coupling nut (13), and detach the return tube assembly from the check valve (12).

(11) Loosen the coupling nut (15), and detach the pressure tube assembly (14) from the tube cross (16).

(12) Remove the quick-release pin (2) or straight pin (19). Pivot the link assembly (1) toward the rear of the equipment section to prevent interference when the HPU is removed.

CAUTION: The weight of the HPU (approximately 61 pounds) should be supported while performing step (15) below, to prevent binding of bolts.

(13) Remove the hexagon-head bolts (1, fig. 12-45), flat washers (2), and hexagon nuts (3),



1—Connector P144
2—Connector J144
3—Connector P143
4—Connector J143

5—Negative lead
6—Cable nipple (2)
7—0.328-in-id fl-washer (2)
8—5/16-in-id lock washer (2)

9—5/16-24 hex nut (2)
10—Positive lead
11—Positive terminal stud

Figure 12-43. Disconnection and connection of the hydraulic pumping unit electrical wiring.

and allow the HPU to rest on the bottom of the equipment section access opening.

(14) Move the HPU approximately $\frac{1}{4}$ inch to the rear of the equipment section, to insure clearance from the structure upon removal.

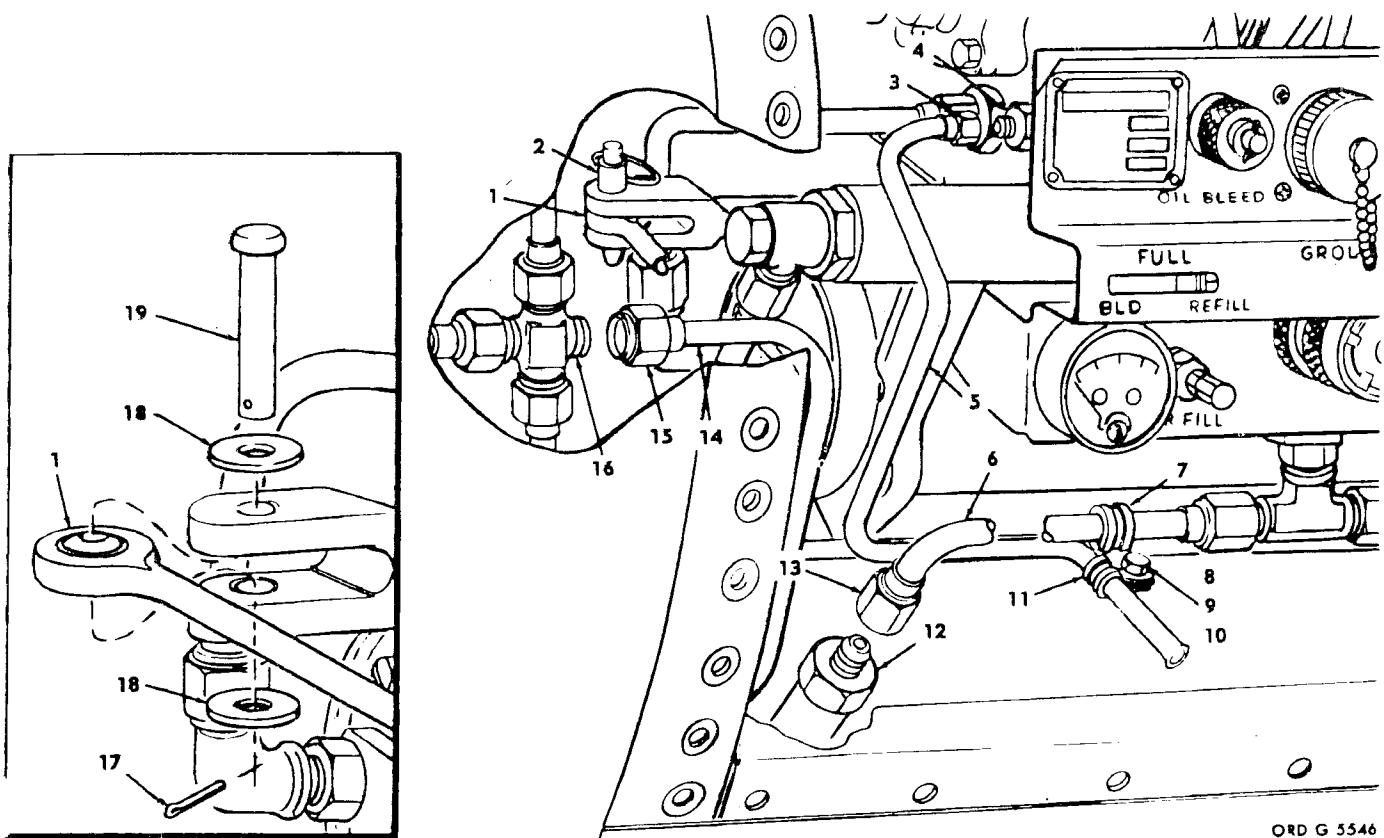
(15) Move the forward end of the HPU (fig. 12-46) partially out of the equipment section. Tilt the HPU slightly back into the equipment section, and carefully remove the HPU.

(16) Position the dump tube assembly (5, fig. 12-44), and attach to the manifold assembly (4).

(17) Install the quick-release pin (2) or straight pin (19) in the link assembly (1).

b. Installation.

(1) Check that the shorting connector (fig. 10-9) is installed on rocket motor igniter cable connector P109A.



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- 1—Link assy
- 2—Quick-release pin
- 3—Coupling nut
- 4—Manifold assy
- 5—Dump tube assy
- 6—Return tube assy
- 7—Clamp
- 8—No. 10-32 x 15/32 hex-hd bolt
- 9—No. 10 washer
- 10—No. 10-32 hex nut

- 11—Clamp
- 12—Check valve
- 13—Coupling nut
- 14—Pressure tube assy
- 15—Coupling nut
- 16—Tube cross
- 17—1/16 dia x 1/2 cotter pin
- 18—1/4 fl washer
- 19—1/4 dia x 1.484 str pin

Figure 12-44. Removal and installation of the hydraulic pumping unit rear attachments.

(2) Loosen the coupling nut (3, fig. 12-44), and detach the dump tube assembly (5) from the manifold assembly (4).

CAUTION: The weight of the HPU (approximately 61 pounds) should be supported while installing the HPU to prevent binding.

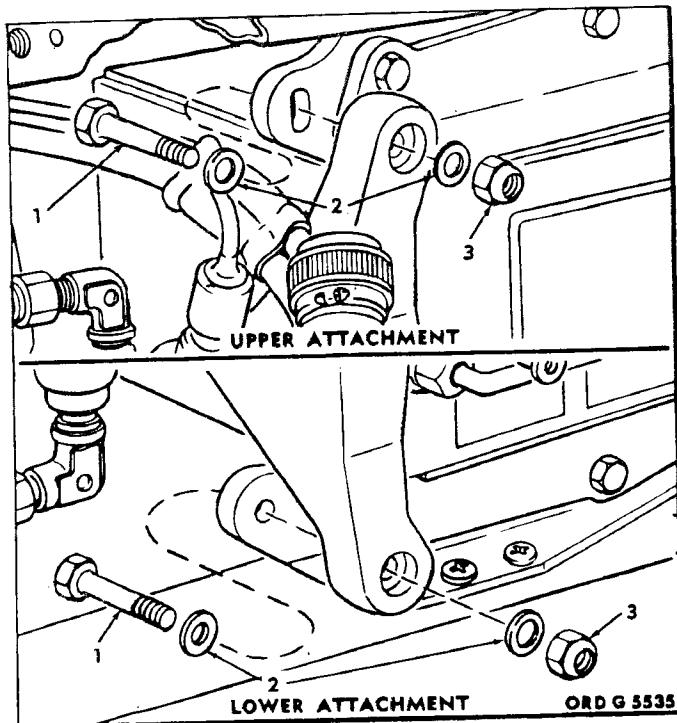
(3) Pivot the link assembly (1, fig. 12-44) to position on the HPU and insert the quick-release pin (2) or straight pin (19).

(4) Place the HPU in the equipment sec-

tion (fig. 12-46), and align the mounting holes in the HPU (fig. 12-45) with the mounting holes in the missile structure.

(5) Install the hexagon-head bolts, flat washers, and hexagon nuts (fig. 12-45) to secure the HPU to the missile structure. Tighten the nuts to a torque value of 120 pound-inches.

(6) Attach the pressure tube assembly (14, fig. 12-44) to the tube cross (16). Tighten to a torque value of 300 pound-inches.



1—5/16-24 x 1-15/32 hex-hd bolt

2—5/16 fl washer

3—5/16-24 hex. nut

Figure 12-45. Removal and installation of the hydraulic pumping unit front attachments.

(7) Attach the return tube assembly (6) to the check valve (12). Tighten to a torque value of 110 pound-inches.

(8) Attach the dump tube assembly (5) to the manifold assembly (4).

(9) Position the clamps (7 and 11) on the dump tube assembly and the return tube assembly, and secure them with the hexagon-head bolt (8), flat washer (9), and hexagon nut (10).

(10) Connect connectors P143 (3, fig. 12-43) and P144 (1) to connectors J143 (4) and J144 (2), respectively.

(11) Connect the positive lead (10) to the positive terminal stud (11), and secure with the flat washer (7), lockwasher (8), and hexagon nut (9). Position the cable nipple (6) over the positive terminal stud.

(12) Repeat step (11) above to connect the negative lead (5).

(13) Remove the shorting dummy connector (1, fig. 10-4) from connector J544 (3) and connect connector P544 (2) to connector J544.

(14) Perform the air and oil servicing of the HPU as prescribed in chapter 4, section II.

(15) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile and tighten the screws to the torque value given in table 15-9.

(16) Rerarm the missile, using applicable procedures in chapter 10.

12-71. Replacement of the Ventilator Assembly

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate (2, fig. 3-21).

WARNING: If the HPU battery has been activated, the ventilator assembly will contain a caustic solution injurious to personnel and equipment. Do not remove the ventilator assembly from the battery. The ventilator assembly must not be reused.

(3) Disconnect the coupling nut (7, fig. 12-47) from the HPU squib battery (3).

(4) Remove the hexagon nuts (5), flat washers (2), and truss-head screws (1) securing the ventilator assembly (4) to the HPU squib battery; remove the ventilator assembly.

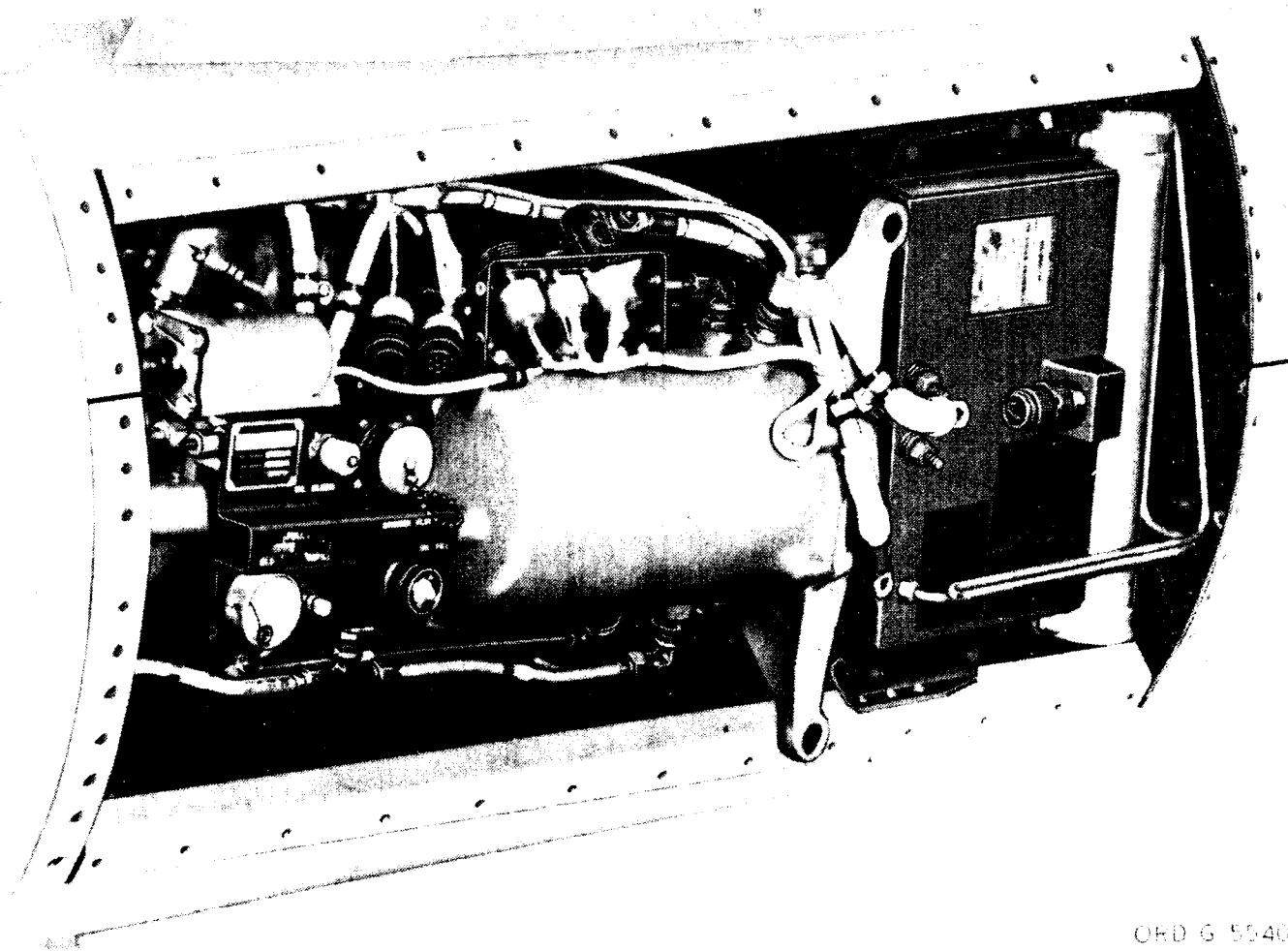
b. Installation.

(1) Place the coupling nut (7) and the sleeve (8) on the overflow tube (6) of the ventilator assembly.

(2) Position the ventilator assembly (4) on the HPU squib battery (3), and secure with the hexagon nuts (5), flat washers (2), and truss-head screws (1).

NOTE. Insure that the overflow tube is fully bottomed in the battery vent fitting before tightening the coupling nut.

(3) Connect the coupling nut to the HPU squib battery, and tighten to the torque value in table 15-9.



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Figure 12-46. Removal and installation of the hydraulic pumping unit.

(4) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(5) Rerarm the missile, using applicable procedures in chapter 10.

12-72. Replacement of the HPU Squib Battery

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

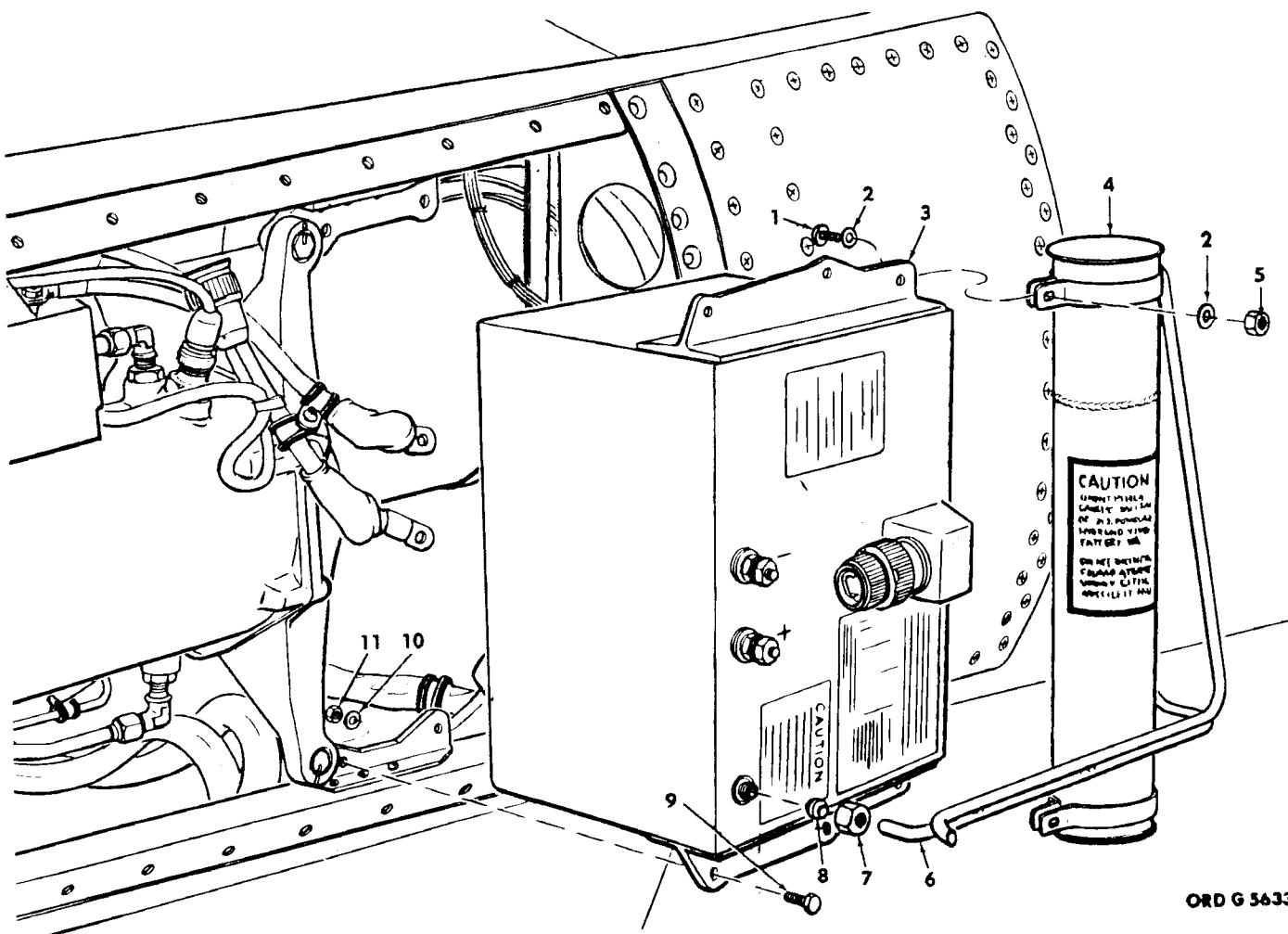
WARNING: If the HPU squib battery has been activated, the ventilator assembly will contain a

caustic solution injurious to personnel and equipment. Do not remove the ventilator assembly from the battery. The ventilator assembly must not be reused.

WARNING: If the HPU squib battery has been activated, perform the procedures in paragraph 4-14, and refer the missile to the direct support unit for replacement of the P, Y, and roll actuators.

(2) Remove the ventilator assembly (par. 12-71a (2) through (4)).

(3) Disconnect the positive and negative leads (par. 12-70a (5) and (6)).



1—No. 10-32 x 5/8 truss-hd screw (2)
 2—0.203-in-id fl washer (4)
 3—HPU squib battery
 4—Ventilator assembly
 5—No. 10-32 hex nut (2)
 6—Overflow tube

7—Coupling nut
 8—Sleeve
 9—1 1/4-28 x 1 1/32 hex-hd bolt (4)
 10—9.265-in-id fl washer (4)
 11—1 1/4-28 hex. nut (4)

Figure 12-47. Removal and installation of the HPU squib battery and ventilator assembly.

CAUTION: The weight of the HPU squib battery (approximately 47 pounds) should be supported while performing step (4) below, to prevent binding of the bolts.

(4) Remove the hexagon nuts (11, fig. 12-47), flat washers (10), and hexagon-head bolts (9) securing the HPU squib battery (3) to the missile structure; remove the battery.

b. Installation.

(1) Test the HPU squib battery (par. 7-9).

CAUTION: The weight of the HPU squib battery (approximately 47 pounds) should be sup-

ported while installing the battery to prevent binding.

(2) Place the HPU squib battery (3, fig. 12-47) in the equipment section, and align the mounting holes in the battery with the mounting holes in the missile structure.

(3) Install the hexagon-head bolts (9), flat washers (10), and hexagon nuts (11) to secure the HPU squib battery to the missile structure. Tighten the bolts to the value given in table 15-9.

(4) Install the ventilator assembly (par. 12-71b (1) through (3)).

(5) Connect the positive lead (10, fig. 12-43) to the positive terminal stud (11), and secure with the flat washer (7), lockwasher (8), and hexagon nut (9). Position the cable nipple (6) over the positive terminal stud.

(6) Repeat step (5) above to connect the negative lead (5).

(7) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(8) Rerarm the missile, using applicable procedures in chapter 10.

12-73. Replacement of Accessory Power Supply (APS) 9032190 or 9030900 with the Hydraulic Pumping Unit (HPU)

NOTE. MWO Y77-W30 must be applied to the missile prior to installing the HPU (missile 10206 through 11935 and 13001 through 13683).

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the APS (par. 12-69a (2) through (13)).

NOTE. Prior to the installation of the HPU, bracket 9028219 and lower bracket 9028195 must be replaced with upper support 9019695 and lower support 9019696 (missiles 10206 through 11935 and 13001 through 13683).

NOTE. Dispose of upper bracket 9028219 and lower bracket 9028195 in accordance with AR 755-5 (CONUS) or AR 755-10 (foreign).

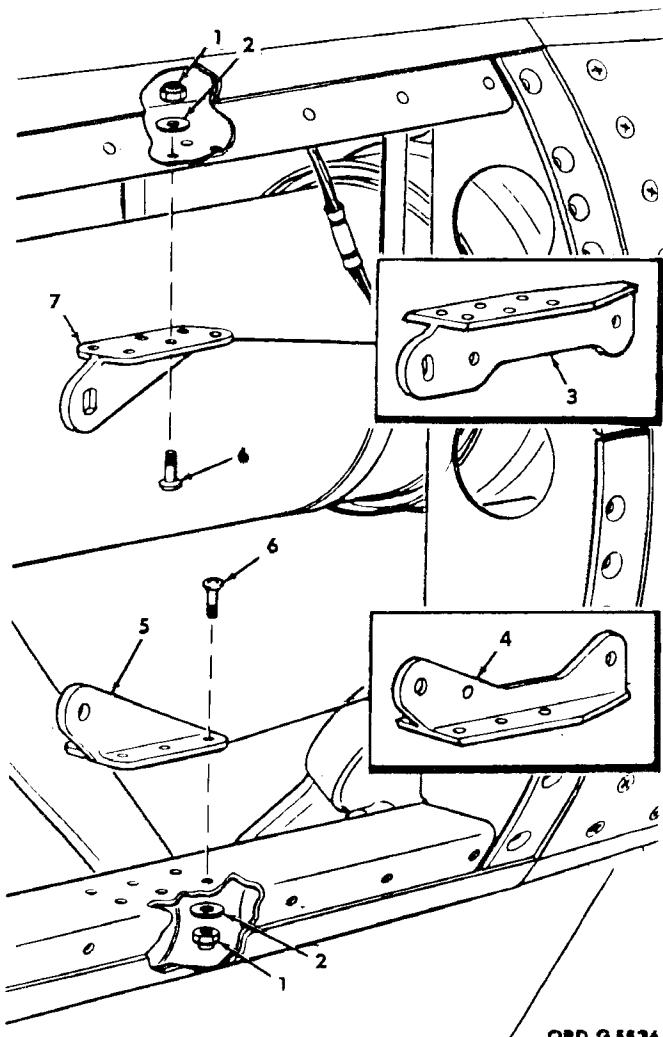
(3) Remove the hexagon nuts (1, fig. 12-48), flat washers (2), and brazier-head screws (6) that secure the upper bracket (7) and the lower bracket (5) to the missile structure; remove the brackets. Retain the nuts, washers, and screws.

(4) Install the support (3 or 4) as prescribed in (a) through (c) below.

(a) Position the support on the missile structure, and align the mounting holes with the holes in the missile structure.

(b) Install the brazier-head screws (6), flat washers (2), and hexagon nuts (1) to secure the support (3 or 4) to the missile structure.

(c) Tighten the nuts to a torque value of 25 pound-inches.



- 1-No. 10-32 hex. nut (12)
- 2-0.203-in-id fl washer (12)
- 3-Upper support
- 4-Lower support
- 5-Lower bracket
- 6-No. 10-32 x 23/32 brazier-hd screw (12)
- 7-Upper bracket

Figure 12-48. Removal of the upper and lower brackets and installation of the upper and lower supports.

(5) Install the remaining support to the missile structure as prescribed in step (4) above.

(6) Remove the seal (6, fig. 3-21) from the equipment section access cover plate (2).

(7) Insert the grommet (4) into the hole in the plate (5) and install the plate in the equipment section access cover plate.

b. Installation.

(1) Install the HPU (par. 12-70b (1) through (13)).

(2) Install the HPU squib battery (par. 12-72b (1) through (6)).

(3) Install the ventilator assembly (par. 12-71b (1) through (4)).

(4) Perform the air and oil servicing of the HPU as prescribed in chapter 4, section II.

(5) Rearm the missile, using applicable procedures in chapter 10.

Section IX. ACCESSORY POWER SUPPLY (APS) SERVICING AND SYSTEM CLEANUP - LAUNCHING AREA

12-74. Air Servicing

WARNING: Safety-and-arming devices M30A1 must be installed in a ready missile at all times to provide fail-safe capability in case of accidental launch.

WARNING: If either or both safety-and-arming devices M30A1 indicate armed (red field), clear the area of all personnel, and notify EOD.

CAUTION: Do not operate the APS continuously for more than 20 minutes. Allow the oil to cool for at least 40 minutes between runs.

CAUTION: Observe the TCG operating cycles as prescribed by tables 4-7, 4-8, and 4-9.

NOTE. Refer to paragraph 4-2 for low temperature operation limitations data and to table 4-12 for hydraulic oil change and buzz voltage requirements.

a. At the launcher control-indicator, set the TEST-FIRE switch to TEST.

b. Open the APS SERVICE DOOR, and check that the arm SAFETY SWITCH is in the center (safe) position (view A, step 2, fig. 4-6).

c. Remove the exhaust vent assembly.

d. Unscrew the external drive motor spline cap (7, fig. 4-8). Unscrew the turbine shaft cap (6), and remove the gasket (5). Inspect the gasket for nicks and compressed areas, and replace it, if necessary. Assemble the turbine shaft cap on the external drive motor spline cap to protect both caps.

e. Connect the power cable assembly (fig. 4-9) to the power connector (8, fig. 4-8) on the external drive motor (1) and to J8B on the launcher power distribution box.

f. Momentarily set the external drive motor switch (fig. 4-9) to ON, and check for counter-clockwise rotation of the external drive motor shaft (view from the power connector side). If the shaft rotation is incorrect, notify the proper authorities.

g. Set the external drive motor switch to OFF, and disconnect the power cable assembly.

h. Make certain that the external drive motor spline (2, fig. 4-8) and turbine shaft (3) are clean and free of foreign matter. Align and engage the external drive motor spline with the turbine shaft. Engage the threads on the external drive motor with the threads on the turbine housing (4), and rotate the external drive motor clockwise to secure in position. Back the motor off approximately $\frac{1}{4}$ of a turn.

WARNING: Check that the external drive motor switch is set to OFF.

i. Connect the power cable assembly to the power connector on the external drive motor.

j. Unlock the elevons (fig. 9-12).

k. At the launcher control-indicator, set the test station selector switch to the appropriate position, the LAUNCHER DC POWER switch to ON; and the HEATERS AND GYRO switch to ON.

CAUTION: Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

l. Set the APS switch to START, and hold between 1 and 2 seconds.

m. Depress the TRANSFER valve (fig. 4-5) on the APS service panel, and hold for a minimum of 5 seconds.

n. Check that the ACC. AIR PRESS. gage (fig. 4-7) indicates at ambient temperature $\pm 25^{\circ}\text{F}$. If the indication is more than 25°F below the ambient temperature, pressurize as prescribed below:

(1) Remove the cap from the AIR FILL fitting on the APS, and connect the air hose from a source of clean, dry air or nitrogen. Open the air or nitrogen supply valve.

(2) Turn the locknut on the AIR FILL fitting counterclockwise until the accumulator begins to fill. Depress and hold the TRANSFER valve until pressurization is obtained.

(3) Pressurize the accumulator to the pressure indication corresponding to the ambient temperature on the scale of the ACC. AIR PRESS. gage. Allow the indication to stabilize.

(4) Tighten the locknut of the AIR FILL fitting, and close the air or nitrogen supply valve.

(5) Momentarily depress the TRANSFER valve, and check that the pressure indication on the ACC. AIR PRESS. gage does not decrease. If the indication does decrease, repeat step (2) through (4) above.

(6) Disconnect the air hose, and install the cap on the AIR FILL fitting.

o. Set the APS switch to STOP, and hold between 1 and 2 seconds.

p. Set the HEATERS AND GYROS switch to OFF.

q. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, immediately set the external drive motor switch to OFF.

r. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *q* above, perform the steps below.

(1) Set the HEATERS AND GYROS switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat *q* above.

s. Disconnect the external drive motor power cable assembly from J8B.

12-75. Hydraulic Oil Servicing, Using the Portable Oil Fill and Filter Unit

NOTE. The portable oil fill and filter unit must be used if available. If not, perform the procedures in paragraph 12-76.

NOTE. Perform the air servicing procedure in paragraph 12-74 above prior to performing the procedures below.

NOTE. Do not reuse oil drained from the APS.

NOTE. If the oil level gage (9, fig. 4-10) on the portable oil fill and filter unit (10) reservoir indicates below REFILL, perform the procedures prescribed in table 4-2, step 11 through 19, using J8B on the launcher power distribution box as the power source, and omit *a* below.

a. Connect the portable oil fill and filter unit power cable assembly (8, fig. 4-10) to J8B on the launcher power distribution box and to POWER connector J1 (14). The LINE POWER indicator light (1) illuminates.

b. Connect the hydraulic oil supply hose (7) to the OIL FILL fitting (fig. 4-5) on the APS service panel.

CAUTION: Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

c. At the launcher control-indicator, check that the TEST-FIRE switch is set to TEST, the test station selector switch to the appropriate position,

and the LAUNCHER DC POWER and HEATERS and GYRO switches to ON.

Set the APS switch to START, and hold between 1 and 2 seconds.

d. Turn the BYPASS valve fully clockwise.

e. Set the OPERATE circuit breaker to ON, and open the OIL BLEED valve (fig. 4-5) on the APS service panel. Allow the oil to flow from the drain hose into a suitable container until free of air bubbles.

f. Close the OIL BLEED valve. Turn the RELIEF valve knob until the OIL PRESS gages indicate 150 ± 10 psi, and turn the locknut fully clockwise. When the HYD. RES. LEVEL indicator moves to BLD., set the OPERATE circuit breaker to OFF.

g. If air bubbles were present in *e* above, perform the steps below.

(1) At the launcher control-indicator, set the VIBRATOR switch to ON (up).

(2) Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

(3) Connect the external drive motor power cable assembly to J8B.

(4) Set the external drive motor switch to ON.

(5) At the section control-indicator, set the launcher designator switch to the appropriate position, and depress and hold the SLEW pushbutton for 10 seconds. The elevons deflect evenly and smoothly.

(6) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

(7) Set the VIBRATOR switch and the external drive motor switch to OFF.

(8) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container. Check the oil flow for air bubbles. When the HYD. RES. LEVEL indicator moves to -45° , close the OIL BLEED valve.

(9) Disconnect the external drive motor power cable assembly from J8B.

(10) Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

(11) If air bubbles were present in step (8) above, set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to BLD, set the OPERATE circuit breaker to OFF and repeat steps (1) through (10) above.

(12) If air bubbles were not present in step (8) above, set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to BLD, set the OPERATE circuit breaker to OFF.

h. Set the APS switch to STOP, and hold between 1 and 2 seconds.

i. Set the HEATERS AND GYROS switch to OFF.

j. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

k. Connect the external drive motor power cable assembly to J8B.

l. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, immediately set the external drive motor switch to OFF.

m. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *l* above, perform the steps below:

(1) Set the HEATERS AND GYROS switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat *l* above.

n. Allow the ACC. AIR PRESS. gage indication to stabilize. If it does not stabilize above 2,500 psi, repeat *l* above.

o. Open the OIL BLEED valve. When the HYD. RES. LEVEL indicator moves to ambient

temperature $\pm 25^\circ$, close the OIL BLEED valve.

p. If the HYD. RES. LEVEL indicator moves lower than the ambient temperature in *o* above, disconnect the external drive motor power cable assembly from J8B, and repeat *a*, and *c* through *o* above.

q. Disconnect the hydraulic oil supply hose from the OIL FILL fitting, and connect it to the quick-disconnect fitting on the manifold return port (12, fig. 4-10) in the portable oil fill and filter unit.

r. Remove the external drive motor from the APS (1, fig. 4-8), and install the turbine shaft cap (6). Torque the cap to 60 pound-inches.

s. Lock the elevons (fig. 9-12).

t. Set all switches to the initial operating condition.

u. Close the APS SERVICE DOOR as directed by higher authority.

12-76. Hydraulic Oil Servicing, Using the Launching Area Oil Fill Valve Assembly

NOTE. If the portable oil fill and filter unit is available, perform the procedures in paragraph 12-75 above, and omit the procedures below. If the portable oil fill and filter unit is not available, perform the procedures below. As soon as it is available, perform the system cleanup procedures in paragraph 12-79 below.

NOTE. Perform the air servicing procedure in paragraph 12-74 above prior to performing the procedures below.

a. Connect the quick-disconnect coupling of hose assembly 9018133 (fig. 12-49) to the pressure fitting at the forward end of the launcher-erecting beam.

b. Connect the quick-disconnect plug of hose assembly 9033977 to the return fitting at the forward end of the erecting beam.

c. Open the MISSILE HYDRAULIC SHUT-OFF valve on the launcher.

CAUTION: Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

d. At the launcher control-indicator, check that the TEST-FIRE switch is set to TEST, the test station selector switch to the appropriate position,

and the LAUNCHER DC POWER and HEATERS AND GYROS switches to ON (up). Set the APS switch to START, and hold between 1 and 2 seconds. Set the HEATERS AND GYROS switch to OFF.

e. Depress the TRANSFER valve (fig. 4-5) on the APS service panel until the ACC. AIR PRESS. gage indication stabilizes.

f. Place the free end of the hose assembly 9033979 (fig. 12-49) in a suitable container.

g. At the launcher control-indicator, set the MISSILE HYDR switch to ON (up).

h. Open the control valve on the oil fill valve assembly, and allow oil to run into the container until air bubbles no longer drain from the hose assembly.

i. Close the control valve and set the MISSILE HYDR switch to OFF.

j. Connect the free end of the hose assembly to the OIL FILL fitting (fig. 4-5) on the APS service panel.

k. Set the MISSILE HYDR switch to ON (up). Open the control valve slowly. Open the OIL BLEED valve on the APS service panel. Allow the oil to flow from the drain hole into a suitable container until free of air bubbles. Close the OIL BLEED valve.

l. When the HYD. RES. LEVEL indicator moves to BLD, close the control valve, and set the MISSILE HYDR switch to OFF.

m. If air bubbles were present in *k* above, perform the steps below.

(1) At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

(2) Install the external drive motor (par. 12-74, *c* through *j*).

(3) Connect the external drive motor power cable assembly to J8B.

(4) Set the external drive motor switch to ON.

(5) At the section control-indicator, set the launcher designator switch to the appropriate position, and depress and hold the SLEW pushbutton for 10 seconds. The elevons deflect evenly and smoothly.

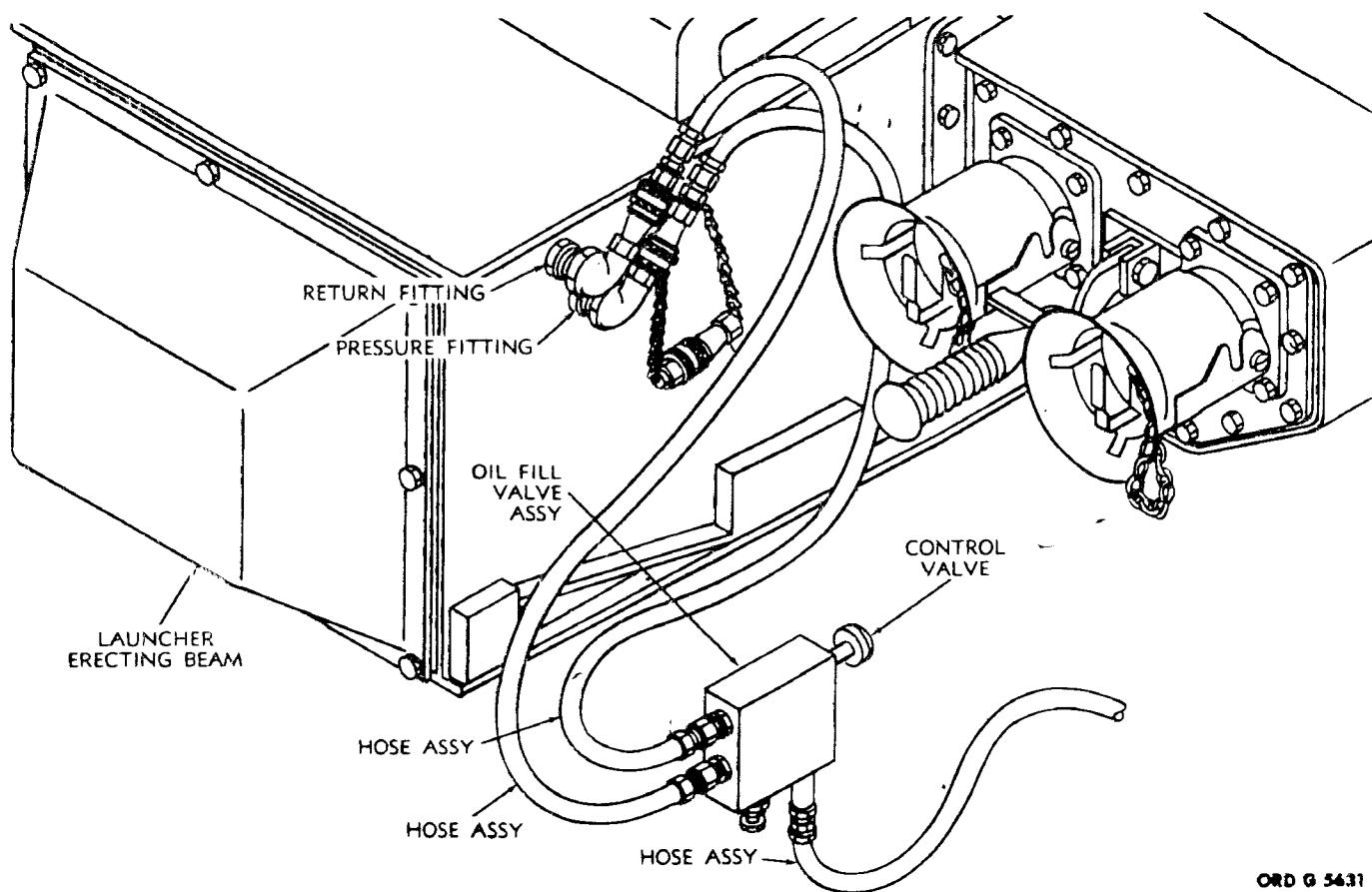


Figure 12-49. APS or HPU oil servicing, using the launching area oil fill valve assembly.

(6) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

(7) Set the VIBRATOR switch, HEATERS AND GYROS switch, and the external drive motor switch to OFF.

(8) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container. Check the oil flow for air bubbles. When the HYD. RES. LEVEL indicator moves to -45° , close the OIL BLEED valve.

(9) If air bubbles were present in step (8) above, set the MISSILE HYDR switch to ON (up), and open the control valve. When the HYD. RES. LEVEL indicator moves to BLD, close the control valve, and set the MISSILE HYDR switch to OFF. Repeat steps (1) through (8) above.

(10) If air bubbles were not present in step (8) above, set the MISSILE HYDR switch to ON (up), and open the control valve. When the HYD. RES. LEVEL indicator moves to BLD, close the valve, and set the MISSILE HYDR switch to OFF.

n. Set the HEATERS AND GYROS switch to ON and the APS switch to STOP, and hold between 1 and 2 seconds.

o. Set the HEATERS AND GYROS switch to OFF.

p. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, immediately set the external drive motor switch to OFF.

q. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi, perform the steps below.

r. Set the HEATERS AND GYROS switch to ON.

(1) Set the APS switch to START, and hold between 1 and 2 seconds.

(2) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(3) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(4) Set the HEATERS AND GYROS switch to OFF.

(5) Repeat *p* above.

s. Allow the ACC. AIR PRESS. gage indication to stabilize. If it does not stabilize above 2,500 psi, repeat *p* above.

t. Open the OIL BLEED valve. When the HYD. RES. LEVEL indicator moves to ambient $\pm 25^\circ$, close the OIL BLEED valve.

u. If the HYD. RES. LEVEL indicator moves lower than the ambient temperature in *t* above, repeat *d* and *k* through *t* above.

v. Disconnect all hose assemblies.

w. Remove the external drive motor from the APS, and install the turbine shaft cap. Torque the cap to 60 pound-inches.

x. Lock the elevons (fig. 9-12).

y. Set all switches to the initial operating condition.

z. Close the APS SERVICE DOOR as directed by higher authority.

12-77. Fuel Servicing

WARNING: ET_hO liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Care should be exercised to keep the ET_hO from dropping on or into the shoes or clothing. Should the ET_hO become confined between the skin and clothing, remove the clothing; immediately wash the skin with soap and water; and allow the clothing to air-dry for several hours. Dispose of contaminated shoes. Should ET_hO get into the eyes, flush them with water, and report to the proper authorities.

WARNING: The maximum allowable concentration of ET_hO vapor is 50 parts of ET_hO per mil-

lion parts of air for an 8-hour exposure. Where high vapor concentration exists, and when working in confined unventilated areas, an approved type self-contained breathing apparatus must be worn.

WARNING: Clear the testing area of all non-participating personnel and flammable materials. Position two manned CO₂ fire extinguishers within 4 feet of the APS, and prohibit smoking within 60 feet. Operating personnel must wear goggles or face masks, rubber gloves, and rubber aprons.

WARNING: Small quantities of unservicable ET_hO should be disposed of by burning, in accordance with applicable instruction, or by diluting with a minimum of 22 parts of water to each part of ET_hO and dumping into a sanitary sewer or a fast-moving stream of water.

WARNING: Permit only the missile that is being refilled to be above ground during the transfer of ET_hO.

WARNING: Insure that the shorting plug is installed in the rocket motor igniter cable.

WARNING: Check that rocket motor safety-and-arming switch S31 indicates SAFE (green field).

a. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYRO switches to ON (up).

CAUTION: Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

b. Set the APS switch to START, and hold between 1 and 2 seconds.

c. Set the HEATERS AND GYRO switch to OFF.

d. Open the APS SERVICE DOOR, and depress the TRANSFER valve (fig. 4-33) on the APS service panel until the ACC. AIR PRESS. gage indication stabilizes.

e. Place the APS filler and nitrogen tank in position, with the nitrogen tank connected to the ET_hO fuel tank.

f. Open the nitrogen tank control valve, and adjust the nitrogen tank regulator valve until the regulator pressure gage indicates 5 psi. Open the ET_hO supply valve, and open the bleeder valve

on the fuel fill hose until all air is exhausted and clear ET_hO flows from the bleeder valve. Immediately close the valve.

g. Connect the static ground lead to the APS service panel.

h. Close the nitrogen tank control valve and the ET_hO supply valve.

WARNING: Before proceeding with the transfer of ET_hO operations, set all controls at the section selector and launcher control-indicator to the shutdown condition.

i. Connect the fuel fill hose to the FUEL FILL fitting on the APS service panel by pushing the quick-disconnect fitting securely into place.

j. Open the nitrogen tank control valve. Adjust the nitrogen tank regulator valve on the nitrogen tank until the regulator pressure gage indicates 200 psi.

k. Open the ET_hO supply valve on the ET_hO fuel tank.

l. Depress and hold the TRANSFER valve until the FUEL LEVEL gage moves from REFILL to FULL. When ET_hO stops flowing in the fuel fill hose, release the TRANSFER valve.

NOTE. Wait at least 1 minute to allow the pressure and the temperature to stabilize as indicated on the ACC. AIR PRESS. gage before performing *m* below.

m. Close the ET_hO supply valve on the ET_hO fuel tank.

n. Remove the fuel fill hose from the FUEL FILL fitting.

o. Disconnect the static ground lead from the APS service panel, and connect it to the plug. Place the fuel fill hose on the APS filler.

p. Set the TEST-FIRE switch to TEST, test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYRO switches to ON (up).

q. Set the APS switch to STOP, and hold between 1 and 2 seconds.

r. Set the HEATER AND GYRO switch to OFF.

s. Install the external drive motor (par. 12-74c through *i*).

t. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, immediately set the external drive motor switch to OFF.

u. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *t* above, perform the steps below.

(1) Set the HEATERS AND GYRO switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYRO switch to OFF.

(6) Repeat *t* above.

v. Check that the FUEL LEVEL gage indicates above REFILL. If the gage indicates below REFILL, repeat *a* through *t* above as required, except set the nitrogen tank regulator valve for an indication of 240 psi in *j* above.

w. Set all switches to the initial operating condition.

x. Remove the external drive motor from the APS and install the turbine shaft cap. Torque the cap to 60 pound-inches.

y. Close the APS SERVICE DOOR as directed by higher authority.

12-78. Oil Purging

When changing from one type of hydraulic oil to another in the APS, perform the procedures prescribed in paragraph 12-79 *a* through *as* below in order to purge the APS of all the old oil.

12-79. System Cleanup

NOTE. The procedure below is to be performed annually or whenever major repair or replacement of the missile hydraulic system is accomplished.

NOTE. Do not reuse oil drained from the APS.

a. Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10), and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the cap.

b. Connect the portable oil fill and filter unit power cable assembly (8) to POWER connector J1 (14) on the portable oil fill and filter unit.

c. At the section control-indicator, set the POWER switch to ON.

Caution: Make certain that the OPERATE circuit breaker (2) on the portable oil fill and filter unit is set to OFF before performing *d* through *g* below.

d. Connect the other end of the power cable assembly to J8B on the launcher power distribution box. The LINE POWER indicator light (1) on the portable oil fill and filter unit illuminates.

e. Connect the hydraulic oil supply hose (7) to the quick-disconnect fitting on the manifold return port (12).

f. Turn the BYPASS valve (4) fully counterclockwise.

g. Turn the RELIEF VALVE knob (3) fully counterclockwise.

Caution: When the OPERATE circuit breaker is set to ON, check for an oil pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF; verify correct power phasing, and perform corrective maintenance procedures.

h. Set the OPERATE circuit breaker to ON.

Note. When performing *i* below, monitor the OIL PRESSURE gage (5) indication. If the indication exceeds 100 psi, refer the portable oil fill and filter unit to the direct support unit for primary filter replacement.

i. Operate the portable oil fill and filter unit for 30 minutes, and then set the OPERATE circuit breaker to OFF.

j. Disconnect the hydraulic oil supply hose from the quick-disconnect fitting on the manifold return port, and turn the BYPASS valve fully clockwise.

k. Remove the right equipment section access cover plate (2, fig. 3-21), and visually inspect the APS and all associated hydraulic lines and electrical connections. Insure that the APS is securely mounted.

l. Connect the hydraulic oil supply hose to the OIL FILL fitting on the APS service panel.

m. Remove the overboard dump tube from the oil bleed port. Connect the drain hose assembly (6, fig. 4-10) to the oil bleed port, and place

the other end in a 2½ gallon (minimum) container.

n. Remove the GUIDANCE TEST AND ADJUST ACCESS DOOR (1, fig. 3-26 or 10, fig. 3-27).

o. Connect cable assembly 8521613 to J1 on the rear of the test control unit and to J2 on the transponder control group.

p. Connect cable assembly 9152989 to J3 on the rear of the test control unit and to J13A on the launcher control-indicator.

q. Unlock the elevons (fig. 9-12).

r. Check that the arm SAFETY SWITCH is in the center (safe) position (view A, step 2, fig. 4-6).

s. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYROS switches to ON (up).

Caution: Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

t. Set the APS switch to START, and hold between 1 and 2 seconds.

u. Set the HEATERS AND GYROS switch to OFF.

v. Depress the TRANSFER valve (fig. 4-5) on the APS service panel until the ACC. AIR PRESS. gage indication stabilizes.

w. Set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator on the APS service panel moves to BLD., set the OPERATE circuit breaker to OFF.

x. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

y. Install the external drive motor on the APS (para 12-74d through *i*).

z. At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

aa. After 60 seconds, set the external drive motor switch to ON.

Warning: Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

Figure 12-50. (Deleted)

ab. At the TCU, set the POWER switch to ON and the POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

ac. Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately one minute. The elevons deflect accordingly.

ad. Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately one minute. The

elevons deflect accordingly. Release the PITCH pushbutton.

ae. Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

af. At the section control-indicator, set the launcher designator switch to the appropriate position.

ag. Depress and hold the SLEW pushbutton for approximately one minute. The elevons deflect evenly and smoothly.

ah. At the test control unit, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

ai. Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF.

aj. Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

ak. Set the external drive motor switch to OFF.

al. Immediately open the OIL BLEED valve. The HYD. RES. LEVEL indicator moves to the -45° position.

am. Depress and hold the transfer valve until oil flow stops. Close the OIL BLEED valve.

an. Disconnect the external drive motor power cable assembly from J8B.

ao. Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

ap. Repeat *w* through *ao* above 8 times.

aq. Attach the quick-disconnect coupling half to the free end of the flexible hose assembly (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil fill and filter unit (10).

ar. Open the OIL BLEED valve, and turn the RELIEF VALVE knob and BYPASS valve fully counterclockwise.

as. Set the OPERATE circuit breaker to ON, and allow the oil to circulate for 5 minutes.

at. Close the OIL BLEED valve, and turn the BYPASS valve fully clockwise.

CAUTION: Do not allow OIL PRESSURE gage indication to exceed 160 psi in *au* below.

au. Turn the RELIEF VALVE knob clockwise sufficiently to allow the HYD. RES. LEVEL indicator to move to BLD.

av. Set the OPERATE circuit breaker to OFF.

aw. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

ax. Connect the external drive motor power cable assembly to J8B.

CAUTION: When performing *ay* below, do not allow the ACC. AIR PRESS. gage indication to fall below 2,500 psi.

ay. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, depress the TRANSFER valve until the ACC. AIR PRESS. gage indicates 2,500 psi. Repeat this cycling of the TRANSFER valve for 30 seconds. Set the external drive motor switch to OFF.

az. Disconnect the external drive motor power cable assembly from J8B.

ba. Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

bb. Repeat *ar* through *ba* above 4 times.

bc. Repeat *ar* through *ay* above.

bd. At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

be. After 60 seconds, set the external drive motor switch to ON.

WARNING: Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

bf. At the test control unit, set the POWER switch to ON. The POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

bg. Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between $+G$ and $-G$ for approximately 1 minute. The elevons deflect accordingly.

bh. Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between $+G$ and $-G$ for approximately 1 minute. The elevons deflect accordingly. Release the PITCH pushbutton.

bi. Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

bj. At the section control-indicator, set the launcher designator switch to the appropriate position.

bk. Depress and hold the SLEW pushbutton for approximately 1 minute. The elevons deflect evenly and smoothly.

bl. At the test control unit, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

bm. Set the HEATERS AND GYROS switch and VIBRATOR switch to OFF.

bn. Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

bo. Set the external drive motor switch to OFF.

bp. Immediately open the OIL BLEED valve. The HYD. RES. LEVEL indicator moves to the -45° position.

bq. Depress and hold the transfer valve until oil flow stops.

br. Close the OIL BLEED valve.

bs. Disconnect the external drive motor power cable assembly from J8B.

bt. Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

bu. Repeat *ar* through *ba* above 5 times.

bv. Repeat *ar* through *ay* above.

bw. Repeat *bd* through *bt* above.

bx. Repeat *ar* through *ba* above 5 times.

by. Repeat *ar* through *ay* above.

bz. Repeat *bd* through *bt* above.

ca. Repeat *ar* through *ba* above 5 times.

cb. Repeat *ar* through *ay* above.

cc. Repeat *bd* through *bt* above.

cd. Repeat *ar* through *ba* above 5 times.

ce. Repeat *ar* through *ay* above.

cf. Repeat *bd* through *bt* above.

cg. Repeat *ar* through *ba* above 6 times.

ch. Check that the OIL BLEED valve is closed and the BYPASS valve is turned fully clockwise.

ci. Set the OPERATE circuit breaker to ON.

CAUTION: Do not allow the OIL PRESSURE gage indication to exceed 160 psi in *cj* below.

cj. Turn the RELIEF VALVE knob clockwise sufficiently to allow the HYD. RES. LEVEL indicator to move to BLD.

ck. Set the OPERATE circuit breaker to OFF.

cl. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

cm. Connect the external drive motor power cable assembly to J8B.

cn. Set the HEATERS AND GYRO switch to ON.

co. Set the APS switch to STOP, and hold between 1 and 2 seconds.

cp. Set the HEATERS AND GYRO switch to OFF.

cq. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, immediately set the external drive motor switch to OFF.

cr. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *cq* above, perform the steps below:

(1) Set the HEATERS AND GYRO switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat *cq.* above.

cs. If the HYD. RES. LEVEL indicator reads less than 25° below the ambient temperature, perform the steps below:

(1) Disconnect the external drive motor power cable assembly from J8B.

(2) Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

(3) Set the HEATERS AND GYRO switch to ON.

(4) Set the APS switch to START, and hold between 1 and 2 seconds.

(5) Set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to the ambient temperature $\pm 25^{\circ}$, set the OPERATE circuit breaker to OFF.

(6) Repeat steps *cn* through *cs*.

(7) Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

ct. If the HYD. RES. LEVEL indicator reads more than 25° above the ambient temperature, allow the oil to cool. Open the OIL BLEED valve, and allow oil to drain until the HYD. RES.

LEVEL indicator moves to the ambient temperature $\pm 25^\circ$. Close the OIL BLEED valve.

cu. Remove the external drive motor from the APS, and install the turbine shaft cap. Torque the cap to 60 pound-inches.

cv. Disconnect the flexible hose assembly from the oil bleed port on the APS and the quick-disconnect fitting on the manifold return port in the portable oil fill and filter unit.

cw. Disconnect the hydraulic oil supply hose from the OIL FILL fitting, and connect it to the quick-disconnect fitting on the manifold return port.

cx. Connect the overboard dump tube to the oil bleed port.

cy. Remove all test cable assemblies.

cz. Lock the elevons (fig. 9-12).

da. Install the right equipment section access cover plate (2, fig. 3-21). Tighten the screws to the torque values given in table 15-9.

db. Install the GUIDANCE TEST AND ADJUST ACCESS DOOR (1, fig. 3-26 or 10, 3-27). Tighten the screws to the torque value given in table 15-9.

dc. Set all switches to the initial operating condition.

Section X. HYDRAULIC PUMPING UNIT (HPU) SERVICING AND SYSTEM CLEANUP-LAUNCHING AREA

12-80. Air Servicing

WARNING: Weight the air supply hose with sand bags. Assure that the air fill valve on the end of the air supply hose is fully closed.

NOTE. Use clean, dry, compressed air, with a dew-point of -40°F and a maximum pressure of 3,500 psi, or use nitrogen.

NOTE. Refer to paragraph 4-9 for low-temperature operation limitations data, and to table 4-12 for hydraulic oil change and buzz voltage requirements.

a. Open the APS SERVICE DOOR.

b. Remove the cap from the AIR FILL valve (3, fig. 4-18) on the HPU, and connect the air supply hose from the air or nitrogen source.

c. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, the LAUNCHER DC POWER and HEATER AND GYRO switches to ON (up), and the VIBRATOR switch to ON (up).

d. Open the air or nitrogen supply valve.

e. Open the AIR FILL valve by turning the locknut counterclockwise until the accumulator begins to fill.

f. Pressurize the accumulator to the accumulator air pressure gage indication corresponding to the ambient temperature reading as prescribed in TM 9-1440-250-12/1.

g. Tighten the locknut of the AIR FILL valve clockwise, and close the air supply valve. Allow the ACC. AIR PRESS. gage indication to stabilize.

Repeat steps *c* through *f* to obtain a stable indication.

h. Close the air supply shutoff valve; disconnect the air supply hose; and install the cap (5) on the AIR FILL valve (3). Torque the AIR FILL locknut to 50 pound-inches.

i. Return all switches to the initial operating condition.

12-81. Hydraulic Oil Servicing, Using the Portable Oil Fill and Filter Unit

NOTE. The portable oil fill and filter unit must be used if available. If not, perform the procedures in paragraph 12-82 below.

NOTE. Perform the air servicing procedure in paragraph 12-80 above prior to performing the procedures below.

NOTE. Do not reuse oil drained from the HPU.

a. Connect the external power cable assembly (5, fig. 4-14) to J1 (3) on the distribution box (2) at the power conversion unit and to J8B at the launcher power distribution box.

b. Connect the HPU power cable assembly to J2 (12) on the meter cabinet (1) at the power conversion unit and to GROUND PLUG connector J546 (7, fig. 4-16) on the HPU indicator panel.

c. Install the strap (2) on the missile.

d. Connect the portable oil fill and filter unit power cable assembly (8, fig. 4-10) to POWER connector J1 (14) on the portable oil fill and filter unit.

e. Connect the other end of the power cable assembly to ETO APS RUNUP MOTOR connector J2 on the distribution box (2, fig. 4-14) at the power conversion unit.

f. Set the ETO APS RUNUP MOTOR circuit breaker to ON; the LINE POWER indicator light (1, fig. 4-10) on the portable oil fill and filter unit illuminates.

g. Connect the hydraulic oil supply hose to the OIL FILL valve (6, fig. 4-17) on the HPU indicator panel (1).

h. Set the OPERATE circuit breaker (2, fig. 4-10) to ON.

i. Turn the RELIEF VALVE knob (3) until the OIL PRESSURE gage (5) indicates 110 ± 10 psi, and turn the locknut (13) fully clockwise.

j. Open the OIL BLEED valve on the HPU indicator panel. Allow the oil to flow from the drain hose into a suitable container until free of air bubbles.

k. Close the OIL BLEED valve. When the hydraulic reservoir level indicator moves to FULL, set the OPERATE circuit breaker to OFF.

l. If air bubbles were present in j above, perform the steps below.

(1) Unlock the elevons (fig. 9-12).

(2) At the launcher control-indicator, set the TEST-FIRE switch to TEST, the station selector switch to the appropriate position, the LAUNCHER DC POWER switch to ON (up), the HEATERS AND GYROS switch to ON (up), and the VIBRATOR switch to ON (up).

(3) At the power conversion unit, set the ELECTRICAL HPU POWER circuit breaker to ON. The ELECTRICAL HPU POWER indicator light illuminates.

(4) Depress the ELECTRICAL HPU START pushbutton.

(5) Depress the PUSH TO READ DC current pushbutton. The DC CURRENT meter does not exceed 120 amperes. The DC VOLTAGE meter indicates 27.9 to 35.6 volts.

(6) At the section control-indicator, set the launcher designator switch to the appropriate position; depress and hold the SLEW pushbutton

for 10 seconds. The elevons deflect evenly and smoothly.

(7) Depress the ELECTRICAL HPU STOP pushbutton.

(8) Set the ELECTRICAL HPU POWER circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.

(9) Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF.

(10) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container.

(11) Set the OPERATE circuit breaker to ON, and close the OIL BLEED valve when the oil stream is free of air bubbles. When the hydraulic reservoir level indicator moves to FULL, set the OPERATE circuit breaker to OFF. Repeat steps (1) through (10) above as necessary to remove all air bubbles.

(12) Lock the elevons.

m. Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

n. Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port in the portable oil fill and filter unit.

o. Remove the cable assemblies and test equipment.

p. Set all switches to the initial operating condition.

q. Close the APS SERVICE DOOR.

12-82. Hydraulic Oil Servicing, Using the Launching Area Oil Fill Valve Assembly

NOTE. If the portable oil fill and filter unit is available, perform the procedures in paragraph 12-81 above, and omit the procedures below. If the portable oil fill and filter unit is not available, perform the procedures below. As soon as it is available, perform the system cleanup procedures in paragraph 12-84 below.

NOTE. Perform the air servicing procedure in paragraph 12-80 above prior to performing the procedures below.

a. Connect the quick-disconnect coupling of hose assembly 9018133 (fig. 12-49) to the pressure fitting at the forward end of the launcher-erecting beam.

b. Connect the quick-disconnect plug of hose assembly 9033977 to the return fitting at the forward end of the erecting beam.

c. Place the free end of hose assembly 9033979 in a suitable container.

d. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, the LAUNCHER DC POWER switch to ON (up), and the MISSILE HYDR switch to ON (up).

e. Open the MISSILE HYDRAULIC SHUT-OFF valve on the launcher.

f. Open the control valve on the oil fill valve assembly, and allow oil to run into the container until air bubbles no longer drain from the hose assembly.

g. Close the control valve, and set the MISSILE HYDR switch to OFF.

h. Connect the free end of the hose assembly to the OIL FILL valve (6, fig. 4-17) on the HPU indicator panel.

i. Set the MISSILE HYDR switch to ON (up). Open the control valve slowly. Open the OIL BLEED valve on the HPU indicator panel. Allow the oil to flow from the drain hose into a suitable container until free of air bubbles. Close the OIL BLEED valve.

j. Open the control valve. When the hydraulic reservoir level indicator moves to FULL, immediately close the control valve, and set the MISSILE HYDR switch to OFF.

k. If air bubbles were present in *i* above, perform the steps below:

- (1) Perform the procedures in paragraph 12-81a through *c* above.
- (2) Unlock the elevons (fig. 9-12).
- (3) At the launcher control-indicator, set the HEATERS AND GYROS switch to ON (up) and the VIBRATOR switch to ON (up).
- (4) At the power conversion unit, set the ELECTRICAL HPU POWER circuit breaker to ON. The ELECTRICAL HPU POWER indicator light illuminates.

- (5) Depress the ELECTRICAL HPU START pushbutton.
- (6) Depress the PUSH TO READ DC CURRENT pushbutton. The DC current meter does not exceed 120 amperes. The DC VOLTAGE meter indicates 27.9 to 35.6 volts.
- (7) At the section control-indicator, set the launcher designator switch to the appropriate position, and depress and hold the SLEW pushbutton for 10 seconds. The elevons deflect evenly and smoothly.
- (8) Depress the ELECTRICAL HPU STOP pushbutton.
- (9) Set the ELECTRICAL HPU POWER circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.
- (10) Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF.
- (11) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container.
- (12) Set the MISSILE HYDR switch to ON (up), and open the control valve. Close the OIL BLEED valve when the oil steam is free of air bubbles. When the hydraulic reservoir level indicator moves to FULL, close the control valve, and set the MISSILE HYDR switch to OFF.
- (13) Lock the elevons.
- l.* Disconnect all hose assemblies.
- m.* Remove all cable assemblies and test equipment.
- n.* Set all switches to the initial operating condition.
- o.* Close the APS SERVICE DOOR.

12-83. Oil Purging

When changing from one type of hydraulic oil to another in the HPU, perform the procedures prescribed in paragraph 12-84a through *aw* below in order to purge the HPU of all the old oil.

12-84. System Cleanup

Note. The procedure below is to be performed annually.

Note. Do not reuse oil drained from the HPU.

a. Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10), and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the cap.

b. At the section control-indicator, set the POWER switch to ON.

c. Connect the portable oil fill and filter unit power cable assembly (8) to POWER connector J1 (14) on the portable oil fill and filter unit.

Caution: Make certain that the OPERATE circuit breaker (2, fig. 4-10) is set to OFF before performing *d* through *l* below.

d. Connect the external power cable assembly (5, fig. 4-14) to J1 (3) on the distribution box (2) at the power conversion unit and to J8B at the launcher power distribution box.

e. Connect the other end of the portable oil fill and filter unit power cable assembly to ETO APS RUNUP MOTOR connector J2 on the distribution box at the power conversion unit.

f. Set the ETO APS RUNUP MOTOR circuit breaker to ON, and the LINE POWER indicator light (1, fig. 4-10) on the portable oil fill and filter unit illuminates.

Note. Perform *g* through *i* below for a mobile-type installation only.

g. Open the door on the test station truck, and lock the cable boom in operating position.

h. Open the access door (8, fig. 4-15) at the test station truck distribution box.

i. Connect cable assembly 8004456 to J9 on the test station truck distribution box and to J13B at the launcher power distribution box.

j. Connect the hydraulic oil supply hose (7, fig. 4-10) to the quick-disconnect fitting on the manifold return port (12).

k. Turn the BYPASS VALVE knob (4) fully counterclockwise.

l. Turn the RELIEF VALVE knob (3) fully counterclockwise.

Caution: When the OPERATE circuit breaker is set to ON, check for a pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF; verify correct power phasing, and perform corrective maintenance procedures.

m. Set the OPERATE circuit breaker to ON.

Note. When performing *n* below, monitor the OIL PRESSURE gage (5) indication. If the indication exceeds 100 psi, refer the portable oil fill and filter unit to the direct support unit for primary filter replacement.

n. Operate the portable oil fill and filter unit for 30 minutes, and then set the OPERATE circuit breaker to OFF.

o. Disconnect the hydraulic oil supply hose from the quick-disconnect fitting on the manifold return port, and turn the BYPASS VALVE knob fully clockwise.

p. Remove the right equipment section access cover plate (2, fig. 3-21).

q. Visually inspect the HPU and all associated hydraulic lines and electrical connections. Insure that the HPU is securely mounted.

r. Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

s. Connect the hydraulic oil supply hose to the OIL FILL valve (6, fig. 4-17) on the HPU indicator panel.

t. Remove the overboard dump tube from the oil bleed port on the HPU. Connect the drain hose (6, fig. 4-10) to the oil bleed port, and open the OIL BLEED valve. Bleed all the oil from the HPU into a 2½ gallon (minimum) container.

Caution: Insure the ELECTRICAL HPU STOP pushbutton on the power conversion unit is depressed and the ELECTRICAL HPU POWER circuit breaker is set to OFF before performing *u* below.

u. Connect the HPU power cable assembly to J2 (12, fig. 4-14) on the meter cabinet (1) at the power conversion unit and to GROUND PLUG connector J546 (7, fig. 4-16) on the HPU indicator panel.

- v. Install the strap (2) on the missile.
- w. Remove the GUIDANCE TEST AND ADJUST ACCESS DOOR (10, fig. 3-27).
- x. Connect cable assembly 8521613 to J1 on the rear of the test control unit and to J2 on the transponder control group.
- y. Unlock the elevons.
- z. Set the ETO APS RUNUP MOTOR circuit breaker to ON. The LINE POWER indicator light illuminates.
- aa. Check that the BYPASS valve is turned fully clockwise.
- ab. Set the OPERATE circuit breaker to ON.
- ac. Close the OIL BLEED valve when the oil stream is free of air bubbles.
- ad. Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates 110 ± 10 psi and turn the locknut fully clockwise.
- ae. When the hydraulic reservoir level indicator moves to the BLD AREA, set the OPERATE circuit breaker to OFF.

Note. Perform *af* below for a permanent type installation only.

- af. Connect cable assembly 9152989 to J3 on the rear of the test control unit and to J13A on the launcher control-indicator.

- ag. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector-switch to the appropriate position, and the LAUNCHER DC POWER switch to ON (up).

Note. Perform *ah* below for a mobile-type installation only.

- ah. At the test station truck distribution box, set circuit breaker CB9 to ON.

- ai. At the power conversion unit, set the ELECTRICAL HPU POWER circuit breaker to ON. The ELECTRICAL HPU POWER indicator light illuminates.

WARNING: Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

- aj. At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

- ak. Depress the ELECTRICAL HPU START pushbutton.

al. At the test control unit, set the POWER switch to ON. The POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

am. Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly.

an. Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly. Release the PITCH pushbutton.

ao. Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

ap. At the section control-indicator, set the launcher designator switch to the appropriate position.

aq. Depress and hold the SLEW pushbutton for approximately 1 minute. The elevons deflect evenly and smoothly.

ar. At the TCU, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

as. Depress the ELECTRICAL HPU STOP pushbutton.

at. Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF after the pressure has equalized.

au. Open the OIL BLEED valve, and drain all the oil from the HPU into a $2\frac{1}{2}$ gallon (minimum) container.

av. Repeat *aa* through *ae* above.

aw. Repeat *aj* through *au* above.

ax. Attach the quick-disconnect coupling half to the free-end of the flexible hose assembly (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil and filter unit.

Note. If oil is visible on the oil level gage (9) on the portable oil fill and filter unit, sufficient oil is available for the remainder of the cleanup procedure.

ay. Check that the OIL BLEED valve is open.

az. Turn the RELIEF VALVE knob and the BYPASS valve fully counterclockwise. Set the OPERATE circuit breaker to ON, and allow the oil to circulate for 15 minutes.

ba. Close the OIL BLEED valve, and turn the BYPASS valve fully clockwise.

bb. Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates 110 ± 10 psi, and turn the locknut fully clockwise.

bc. When the hydraulic reservoir level indicator moves to BLD., set the OPERATE circuit breaker to OFF.

WARNING: Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

bd. Repeat *aj* through *at* above.

be. Open the OIL BLEED valve, and allow the oil to return to the portable oil fill and filter unit. All the oil has returned with the OIL LEVEL gage indication stops increasing.

bf. Repeat *az* through *be* above 10 times.

bg. Repeat *az* through *bc* above.

bg.1. Open the OIL BLEED valve and allow the oil to return to the portable oil fill and filter unit until the hydraulic reservoir level indicator moves to FULL. Close the OIL BLEED valve.

Note. Perform *bh* below for a mobile-type installation only.

bh. Set circuit breaker CB9 to OFF.

bi. Set the ELECTRICAL HPU POWER

circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.

bj. Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

bk. Disconnect the flexible hose assembly from the oil bleed port on the HPU and the quick-disconnect fitting on the manifold return port in the portable oil fill and filter unit.

bl. Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port.

bm. Connect the overboard dump tube to the oil bleed port.

bn. Lock the elevons.

bo. Remove all cable assemblies and test equipment.

bp. Install the right equipment section access cover plate (2, fig. 3-21). Tighten the screws to the torque values given in table 15-9.

bq. Install the GUIDANCE TEST AND ADJUST ACCESS DOOR (10, fig. 3-27). Tighten the screws to the torque values given in table 15-9.

br. Set all switches to the initial operating condition.

Section XI. CORRECTIVE MAINTENANCE OF THE ACTUATOR SECTION

12-85. Replacement of the Actuator Section Door Assemblies

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the actuator section door assemblies.

b. Installation.

(1) Install the actuator section door assemblies and tighten the screws to the torque value given in table 15-9.

(2) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-86. Replacement of the Index Pin

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

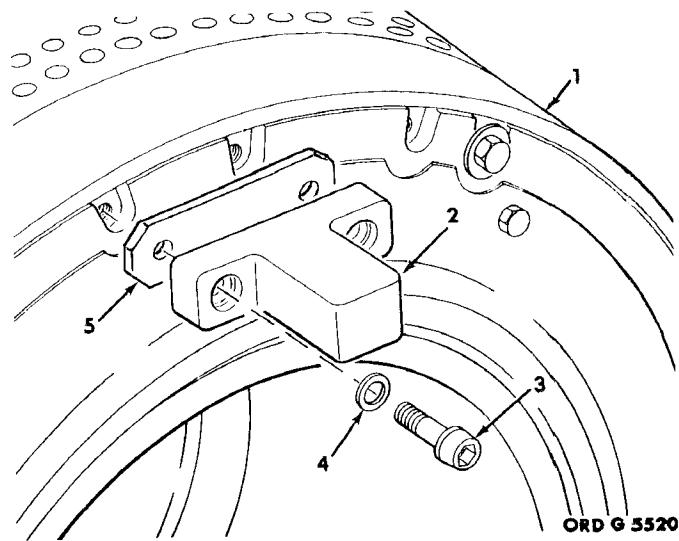
(2) Remove the internal-wrenching bolts (3, fig. 12-51), recessed washers (4), and the shim (5) (missiles 10206 through 11187) that secure the index pin (2) to the rear of the actuator section (1); remove the index pin.

b. Installation.

(1) On missiles 10206 through 11187, place the shim (5) between the rear of the actuator section (1) and the index pin (2).

(2) Secure the index pin to the rear of the actuator section (1) with the internal-wrenching bolts (3) and recessed washers (4). Tighten the bolts to a torque value of 120 pound-inches, and secure with safety wire.

(3) Reactivate the missile, using applicable procedures in chapters 9 and 10.



1—Actuator section
 2—Index pin 8162978 (missiles 10206 through 11187) or 9029046 (missiles 11188 through 11935 and 13001 and subsequent)
 3—5/16-24 x 1-1/4 int-wrenching bolt (2)
 4—0.324-in-id recessed washer (2)
 5—Shim (missiles 10206 through 11187)

Figure 12-51. Removal and installation of the index pin.

12-87. Replacement of the Thermal Battery Assembly

a. *General.* The thermal battery assembly (fig. 12-52) contains two thermal batteries which provide electrical power for igniting the missile rocket motor initiators. The battery assembly is located near the top centerline of the actuator section.

WARNING: Use care when making repairs on the thermal battery assembly. If a thermal battery is discharged, its chemical properties raise the temperature of the battery case to between 300° and 400°F.

Note. If the missile is rejoined for other reasons and the thermal battery assembly required exchange, omit the procedures in paragraphs *b* (1) and (3) below. If the thermal batteries are to be replaced while the missile is positioned on the launching handling rail, omit the procedures in paragraph *b* (2) below.

b. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the actuator section door assembly from the left side of the actuator section. Disconnect connectors P181 and P182 (9 and 11, fig. 12-52) from the thermal battery.

(3) Disconnect connectors P162 and P163 (fig. 5-13) from the rocket motor initiators, and install shorting connectors, using applicable procedures in paragraph 11-4. Remove the BA 472/U battery as prescribed in table 12-1. Disconnect P540 on the mounting panel from connector J540 on the missile distribution box. Disconnect the flexible rubber vent hose from the missile battery box vent tube. Remove the four bolts, nuts, and washers securing the battery rack, and carefully remove the battery rack to facilitate removal and replacement of the thermal battery assembly. Disconnect connectors P181 and P182 (9 and 11, fig. 12-52) from the thermal battery.

(4) Remove the four flathead screws (1) (missiles 10608 through 11935 and 13001 and subsequent), or four self-locking hexagon nuts (8), flat washers (7), and flathead screws (6) (missile 10206 through 10607), securing the thermal battery bracket (12) in the actuator section.

CAUTION: Hold the thermal battery assembly securely to prevent its falling and possibly discharging the batteries.

Note. If the missile is positioned on the launching handling rail the following positioning of the thermal battery assembly will permit easy removal and reinstallation. With reference to the thermal battery assembly when installed, position the underneath side of the thermal battery assembly against the blast tube with the plug connectors pointing up during removal and reinstallation.

(5) Immediately remove the battery assembly to an area free of explosives and flammable material.

c. Inspection and Test.

(1) Inspect each thermal battery (2) for looseness in the thermal battery or for damage; check that the initiator pins (12, figs. 12-53 and 12-54) are intact; perform the inspection outlined in par. 3-9 *b* and *c*.

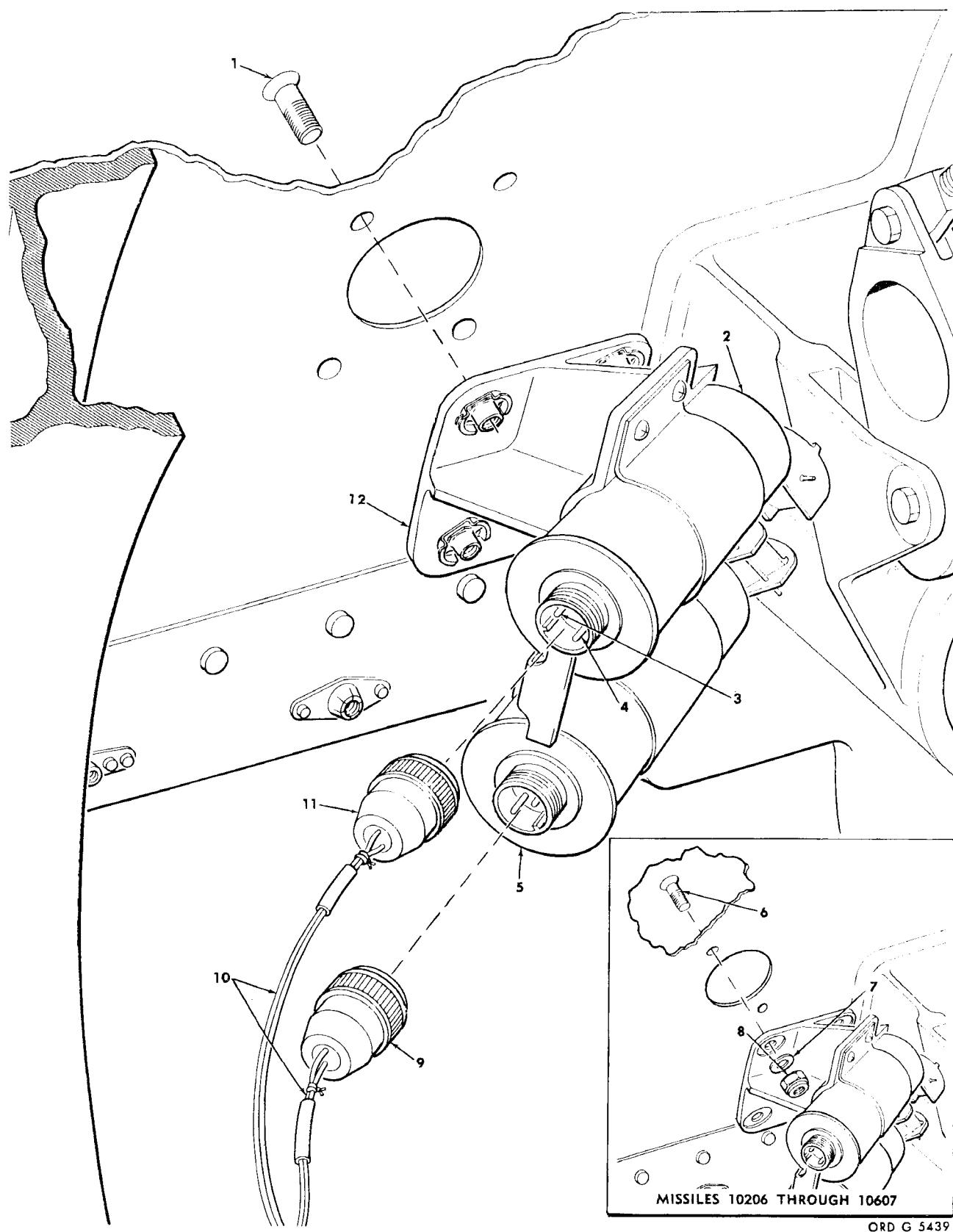


Figure 12-52. Removal and installation of the thermal battery assembly.

(2) Using a multimeter, measure the terminal-to-terminal resistance for a minimum of 0.2 megohm.

d. Disassembly.

WARNING: Disassembly must be performed in the revetted area.

(1) Remove the spring pin (5, fig. 12-53) (missiles 10206 through 10607) or the drilled fillister-head screw (5, fig. 12-54) (missiles 10608 through 11935 and 13001 and subsequent) from the plug (4).

(2) Push the two initiator pins (12) deeper into the holes until the looped head of each pin bottoms against the striker arm bracket (9).

(3) Remove the strap attach screw group (14, fig. 12-53) or five panhead screws (14, fig. 12-54) that fasten the strap (13) to the thermal battery bracket (2).

(4) Install the safety cotter pin (11) through the second pair of holes in the striker arm bracket (9), and spread the ends of the pin.

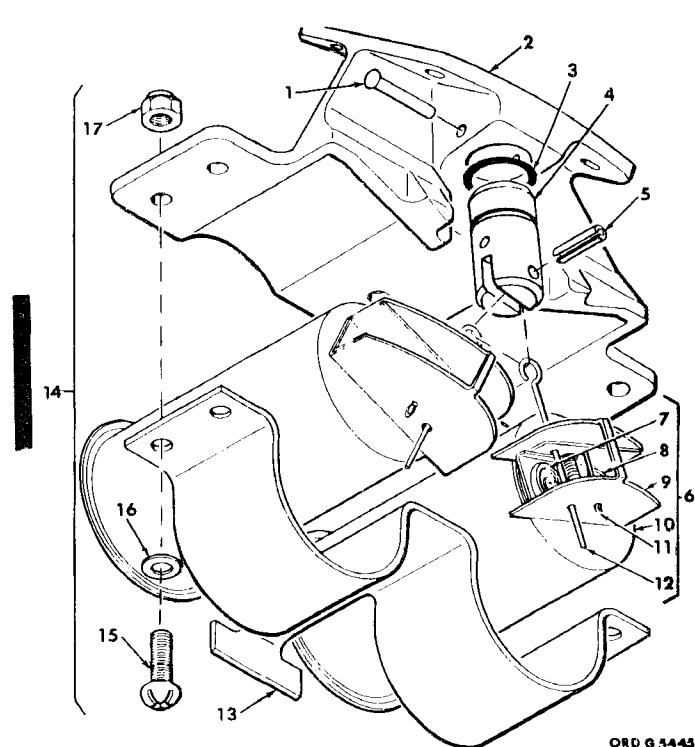
(5) Exert pressure on the exposed end of the plug (4) to insure that the plug retaining rivet (1) is not sheared. If the plug retaining rivet is sheared, replace as outlined in (a) through (f) below.

(a) Exert pressure on the exposed end of plug (4), and remove the plug.

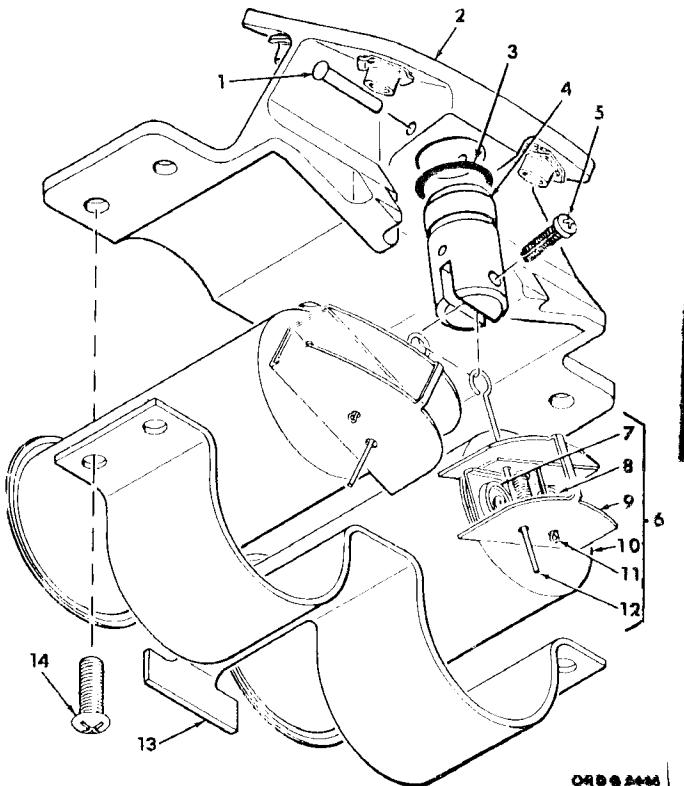
1—No. 10-32 x 19 / 32 fl-hd screw (4)
 2—Thermal battery (2)
 3—Negative terminal
 4—Positive terminal
 5—Thermal battery case (2)
 6—No. 10-32 x 23 / 32 fl-hd screw (4)

7—No. 10 fl washer (4)
 8—No. 10-32 self-lkg hex. nut (4)
 9—Plug connector P181
 10—Motor igniter wiring harness
 11—Plug connector P182
 12—Thermal battery bracket

Figure 12-52—Continued.



ORD G 5445



ORD G 5446

1—3 / 32 x 1 plug retaining rivet
 2—Thermal battery bracket
 3—7 / 16-in-id x 3 / 32-in. thk preformed packing
 4—Plug
 5—0.094 x 0.500 sp pin
 6—Thermal battery group (2)
 7—Strike arm
 8—Percussion cap
 9—Striker arm bracket
 10—Battery
 11—Safety cotter pin
 12—Initiator pin
 13—Strap
 14—Strap attach screw group (2)
 15—No. 8-32 x 3 / 4 truss-hd screw (5)
 16—No. 8 fl washer (5)
 17—No. 8-32 self-lkg hex. nut (5)

Figure 12-53. Disassembly and assembly of the thermal battery assembly for missiles 10206 through 10607.

(b) Using a No. 40 drill, remove the sheared plug retaining rivet (1) from the plug.

1—3 / 32 x 1-in. plug retaining rivet
 2—Thermal battery bracket
 3—7 / 16-in-id 3 / 32-in. thk preformed packing
 4—Plug
 5—No. 4-40 x 1/2-in. drilled fillister-hd screw AN500A4-8 (missiles 10608 through 11187) or 9018658 (missiles 11188 through 11935 and 13001 and subsequent)
 6—Thermal battery group (2)
 7—Striker arm
 8—Percussion cap
 9—Striker arm bracket
 10—Battery
 11—Safety cotter pin
 12—Initiator pin
 13—Strap
 14—No. 10-32 x 5 / 8-in pan-hd screw AN520-10-R10 (5)

Figure 12-54. Disassembly and assembly of the thermal battery assembly for missiles 10608 through 11935 and 13001 and subsequent.

(c) Using a No. 36 drill, remove the sheared plug retaining rivet from the thermal battery bracket.

(d) Remove excess material from the drilled holes in the plug and thermal battery bracket.

(e) Insert the plug in the thermal battery bracket, and aline the holes in the plug with those in the bracket.

(f) Install the plug retaining rivet in the hole alinement in step (e) above, and peen the end of the rivet to secure it in position.

e. Assembly.

WARNING: Assembly must be performed in the revetted area.

(1) Check that a safety cotter pin (11) is installed through the pair of holes in the striker arm bracket (9) located just behind the percussion cap (8) in each of the thermal battery groups (6).

(2) Check that an initiator pin (12) is installed in each of the thermal battery groups.

Note. The looped head of the initiator pin installation for one thermal battery group is reversed from the installation in the other thermal battery group.

CAUTION: Use extreme care in performing the following operations to prevent dislodging the initiator pins and discharging the battery.

(3) Remove the safety cotter pin (11).

(4) Position each thermal battery group (6) in the thermal battery bracket (2) with the looped heads of the initiator pins alined with the slot in the plug (4).

(5) Install the strap (13).

(6) Carefully move the two initiator pins (12) into the slot in the plug (4) until the looped heads of the pins aline with the hole.

(7) Secure the initiator pins as outlined in (a) and (b) below.

(a) *Missiles 10206 through 10607.* Insert a spring pin (5) through the alinement in step (6) above.

(b) *Missiles 10608 through 11935, and 13001 and subsequent.*

1. Apply a coat of insulation compound 5970-162-7523 to the threads of the screw (5, fig. 12-53).

2. Install the screw (5) in the holes alined in (6) above.

f. Installation.

(1) Secure the thermal battery assembly (fig. 12-52) to the skin in the actuator section, and torque the screws to the value given in table 15-9.

(2) Connect the plug connectors (9 and 11) to the thermal batteries (2).

Note. Perform (2.1) and (2.2) below only when the missile is on the launcher-handling rail.

(2.1) Install the battery rack, and secure with four bolts, washers, and nuts.

(2.2) Connect the flexible rubber vent hose to the battery box vent tube and connect P540 on the mounting panel to connector J540 on the missile distribution box.

(3) Install the actuator section door assembly in the left side of the actuator section, and torque to a value as prescribed in table 15-9.

(4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

Section XII. CORRECTIVE MAINTENANCE OF MAIN FINS AND ELEVONS

12-88. Replacement of Forward Main Fins

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward main fins (par. 11-16).

b. Installation.

(1) Install the forward main fins (par. 7-5).

(2) Remove the nose hinge assembly (par. 12-5 b).

(3) Rerarm the missile, using applicable procedures in chapter 10.

12-89. Replacement of the Rear Main Fins

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward main fins (par. 12-88).

(3) Remove the rear main fins (par. 11-33).

b. Installation.

- (1) Install the rear main fins (par. 8-11).
- (2) Install the forward main fins (par. 7-5).
- (3) Remove the nose hinge assembly (par. 12-5b).
- (4) Rerarm the missile, using applicable procedures in chapter 10.

Section XIII. CORRECTIVE MAINTENANCE OF THE SHIPPING AND STORAGE CONTAINERS

12-91. General

a. This section provides instructions for corrective maintenance of the components of shipping and storage containers M409 and M410.

b. The corrective maintenance procedures prescribed in paragraphs 12-91 through 12-97 are applicable to both containers. The procedures prescribed in paragraphs 12-98 and 12-99 are applicable to only the rear body section and forward body section container (M410).

c. Whenever the container cover on the rear body section and forward body section shipping and storage container is removed to perform corrective maintenance, all missile shipping hardware should be inspected and replaced if necessary.

12-92. Replacement of the Air Valve**a. Removal.**

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the air valve (2, fig. 12-55) from the inspection panel (1).

b. Installation.

- (1) Install the air valve (2) in the inspection panel (1).
- (2) Swing the access cover plate (fig. 3-4) closed, and secure with the two wingnuts.

12-93. Replacement of Relief Valve**a. Removal.**

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).

12-90. Replacement of the Elevons**a. Removal.**

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Remove the elevons (par. 11-32).

b. Installation. Install the elevons (par. 3-12).

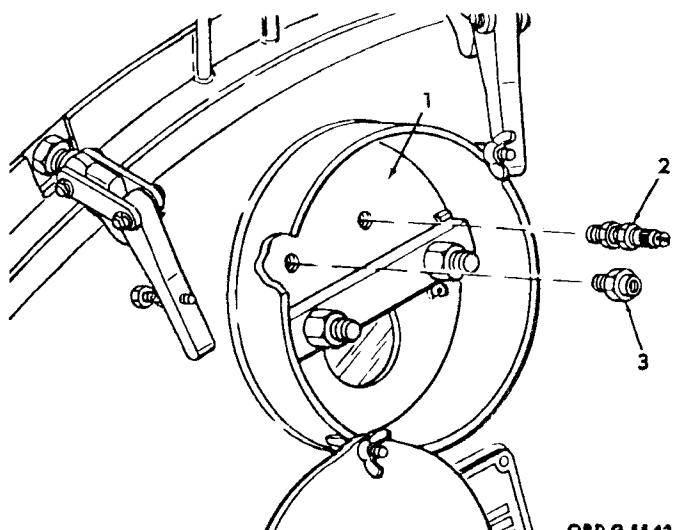
- (2) Remove the relief valve (3, fig. 12-55) from the inspection panel (1).

b. Installation.

- (1) Install the relief valve (3) in the inspection panel (1).
- (2) Swing the access cover plate (fig. 3-4) closed, and secure with the two wingnuts.

12-94. Replacement of the Handle on the Quick-Release Clamp

Warning: Make certain that all of the quick-release clamps (fig. 3-5) are in the position which secures the container cover to the container except the clamp on which the handle is to be replaced.



1—Inspection panel

2—Air valve

3—Relief valve

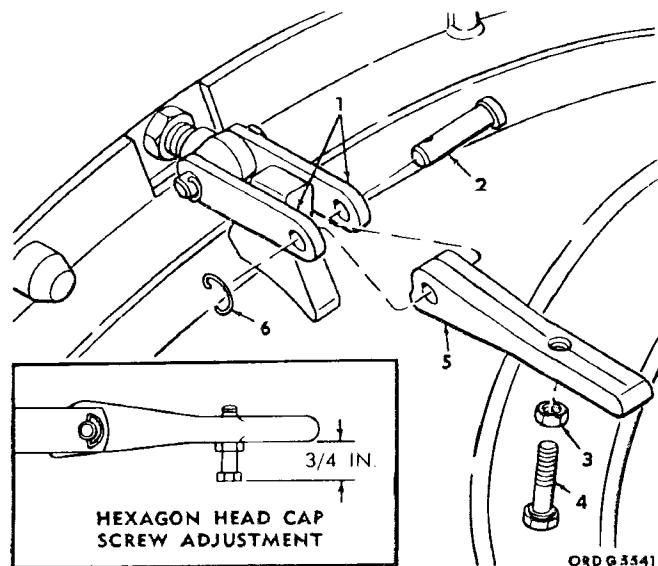
Figure 12-55. Removal and installation of the air valve and relief valve.

a. Removal.

- (1) Loosen the wingnuts (fig. 3-5) that secure the log tube cover plate to the log tube.
- (2) Swing the log tube cover plate upward, and remove the extension handle from the log tube.
- (3) Use the extension handle to disconnect the quick-release clamp on which the handle is to be replaced.
- (4) Remove the hexagon-head capscrew (4, fig. 12-56) and hexagon nut (3) from the handle (5).
- (5) Remove the lockpin (6) that secures the flathead pin (2) in position.
- (6) Remove the flathead pin from the two links (1) and the handle; remove the handle.

b. Installation.

- (1) Position the handle (5) between the two links (1), and aline the hole in each of the two links with the hole in the handle.



1—Link (2)
 2—7/16 x 1-9/16 fl-hd pin
 3—5/16-18 hex nut
 4—5/16-18 x 1-1/4 hex-hd capscrew
 5—Handle
 6—Lockpin

Figure 12-56. Removal and installation of the handle on the quick release clamp.

- (2) Install the flathead pin (2) through the two links and the handle.
- (3) Install the lockpin (6) that secures the flathead pin in position.
- (4) Install the hexagon nut (3) on the hexagon-head capscrew (4) and install the capscrew in the handle.
- (5) Turn the capscrew into the handle until the 3/4-inch dimension shown in figure 12-56 is obtained.
- (6) Hold the hexagon-head capscrew in position, and tighten the hexagon nut against the surface of the handle.
- (7) Use the extension handle (fig. 3-5), and secure the quick-release clamp.
- (8) Replace the extension handle in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.

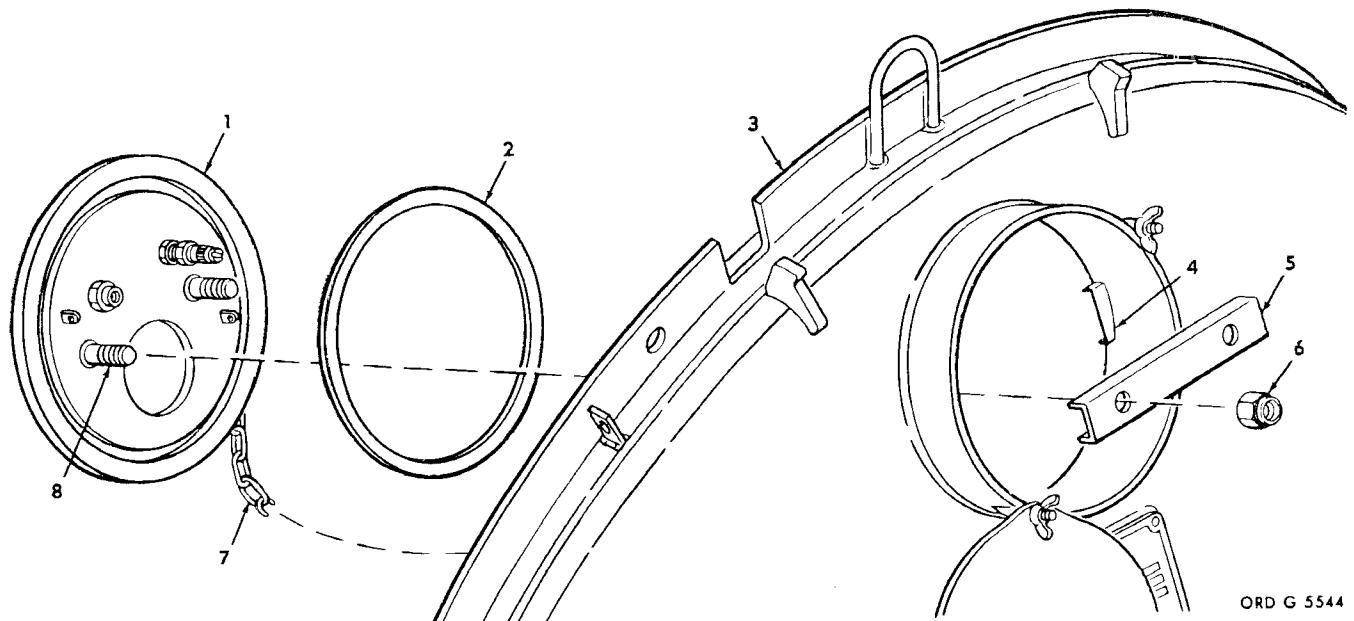
12-95. Replacement of Inspection Panel Clamping Bar and Gasket

a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the container cover (par. 3-6c).
- (3) Remove the hexagon nuts (6, fig. 12-57) that secure the inspection panel clamping bar (5) on the panel group (1).
- (4) Remove the clamping bar from the panel group and the container cover (3).
- (5) Push the panel group out the rear of the container cover, and remove the inspection panel gasket (2).
- (6) Lower the panel group, and allow to hang by the chain (7).

b. Installation.

- (1) Install the inspection panel gasket (2) on the panel group (1).
- (2) Position the panel group, with the gasket installed, in the opening in the container cover (3), and aline the studs (8) on the panel group with the retainers (4) on the container cover.



1—Panel group
2—Inspection panel gasket
3—Container cover

4—Retainer (2)
5—Inspection panel clamping bar
6—1/2-13 hex nut (2)

7—Chain
8—Stud (2)

Figure 12-57. Removal and installation of the inspection panel clamping bar and gasket.

- (3) Install the inspection panel clamping bar (5) on the studs and over the retainers.
- (4) Install the hexagon nuts (6) that secure the clamping bar to the panel group.
- (5) Check that the inspection panel gasket contacts the mating surface of the container cover.
- (6) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (7) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (8) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.
- (9) Swing the access cover plate (fig. 3-4) closed, and secure with the wingnuts.

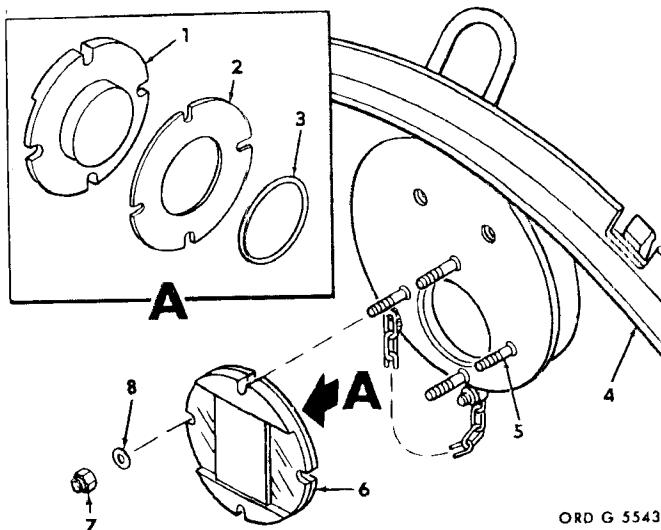
12-96. Replacement of Window Frame and Gasket

a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the container cover (par. 3-5c).
- (3) Remove the hexagon nuts (7, fig. 12-58) and flat washers (8) that secure the window and frame group (6) to the container cover (4).
- (4) Remove the window and frame group from the container cover.
- (5) Remove the gasket (3) and the window frame (2) from the window (1).

b. Installation.

- (1) With the chamfered side of the window frame (2) facing the window (1), install the frame on the window, and align the slots in the frame with the slots in the window.
- (2) Install the gasket (3) on the window.



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- 1—Window
- 2—Window frame
- 3—Gasket
- 4—Container cover
- 5—Stud (4)
- 6—Window frame group
- 7—1/4-20 hex nut (4)
- 8—1/4-in. fl washer (4)

Figure 12-58. Removal and installation of the window frame and gasket.

- (3) Install the window and frame group (6) on the studs (5) on the container cover (4).
- (4) Install the hexagon nuts (7) and flat washers (8) that secure the window and frame group to the container cover.
- (5) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (6) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (7) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.
- (8) Swing the access cover plate (fig. 3-4) closed, and secure with the wingnuts.

12-97. Replacement of the Container Cover Seal

a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).

Warning: Be sure the container pressure is completely equalized before removing the container cover.

- (2) Remove the container cover (par. 3-5c).
- (3) Remove the container cover-seal (3, fig. 12-59) from the seal retaining ring (1).

b. Installation.

- (1) Install the container cover seal (3) in the seal retaining ring (1) with the serrated side (2) facing in.
- (2) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (3) Check that the container cover contacts the container cover seal.
- (4) Replace the extension handle in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.

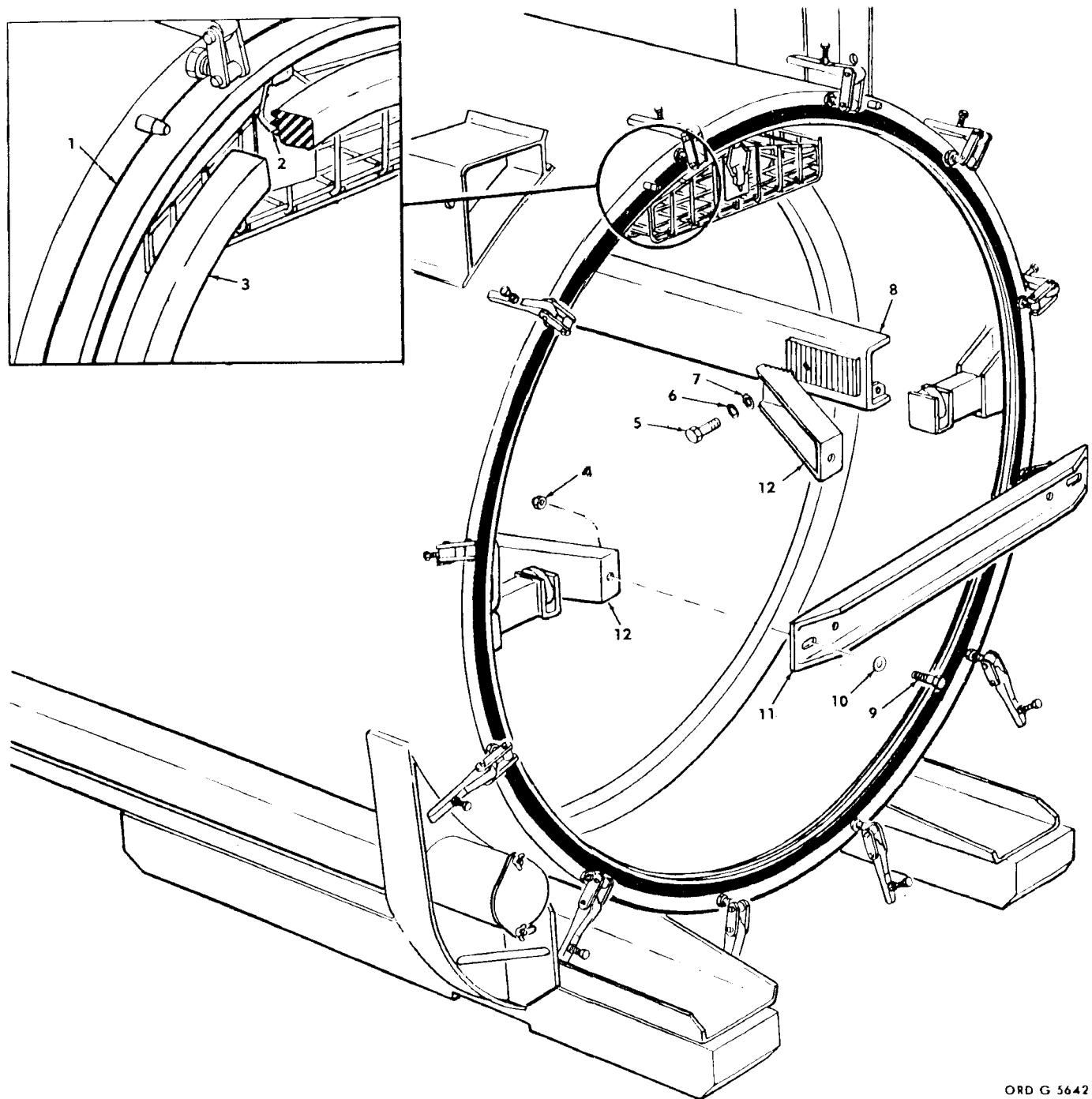
12-98. Replacement of the Forward Body Section Shipping Support Channel

a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).

Warning: Be sure the container pressure is completely equalized before removing the container cover.

- (2) Remove the container cover (par. 3-6c).
- (3) Remove the hexagon nuts (4, fig. 12-59), hexagon-head capscrews (9), and flat washers (10) that secure the forward body section shipping support channel (11) to the two support arms (12), and remove the shipping support channel.



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- 1—Seal retaining ring
- 2—Serrated side
- 3—Container cover seal
- 4—1-1/2-13 hex nut (2)
- 5—1-1/2-13 x 1-1/8 hex-hd capscrew
- 6—1-1/2-in. lockwasher

- 7—1-1/2-in. fl washer
- 8—Moveable track
- 9—1-1/2-13 x 1-5/8 hex-hd capscrew (2)
- 10—1-1/2-in. fl washer (2)
- 11—Forward body section shipping support channel
- 12—Support arm

Figure 12-59. Removal and installation of the container cover seal, forward body section support channel, and support arm.

b. Installation.

- (1) Position the forward body section shipping support channel (11) on the two support arms (12), and secure with the hexagon-head capscrews (9), flat washers (10), and hexagon nuts (4).
- (2) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (3) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (4) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wing-nuts.

12-99. Replacement of the Support Arm*a. Removal.*

- (1) Remove the forward body section shipping support channel (par. 12-98a).
- (2) Remove the hexagon-head capscrew (5), lockwasher (6, fig. 12-59), and flat washer (7) that secure the support arm (12) to the moveable tracks (8), and remove the support arm.

b. Installation.

- (1) Position the support arm (12) on the moveable tracks (8) and secure with the flat washer (7), lockwasher (6), and hexagon-head capscrew (5).
- (2) Install the forward body section shipping support channel (par. 12-98b).

**Section XIV. CORRECTIVE MAINTENANCE OF THE ROCKET
MOTOR CLUSTER****12-100. General**

a. This section contains instructions for the authorized corrective maintenance of the rocket motor cluster listed in TM 9-1410-250-15P/1/1.

b. Prior to performing the replacement of the rocket motor cluster components as prescribed in paragraphs 12-101 through 12-117, the missile will be prepared as prescribed in table 12-1. The safety requirements prescribed in paragraph 12-3 will apply to the operations performed in the launching and revetted areas.

c. In the event it is necessary to move the rocket motor cluster to the revetted area as prescribed in table 12-1 to perform corrective maintenance, removal of the missile body will be accomplished as prescribed in paragraphs 11-10 and 11-11. Removal of the rocket motor cluster to the revetted area will be accomplished as prescribed in paragraphs 11-12 and 11-13.

Warning: The rocket motor cluster contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically

designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

Warning: Handling operations of the rocket motor cluster, will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials must be kept to a minimum. Spilled explosive materials will be thoroughly decontaminated before work continues.

Warning: Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap with a maximum ground resistance of 20 ohms must be attached from the component to a grounding stake. A CO₂ fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

12-101. Replacement of the Rocket Motor Igniters

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Disconnect the rocket motor igniter cable assembly connector (D, fig. 10-9) from the connector of the rocket motor igniter. Immediately install the shorting connector.

(3) Using the spanner wrench, remove the rocket motor igniter (B).

(4) Perform a continuity check of the igniter (par. 10-4c and d or e and f).

b. Installation.

NOTE. The rocket motor igniter must be tested as prescribed in paragraphs 10-4c and d or e and f prior to installation.

(1) Apply a thin coat of soft-film, silicone, corrosion preventive compound to the threads of the rocket motor igniter. Do this semiannually to preclude seizure of the igniter in the rocket motor head.

(2) Using the spanner wrench, install the rocket motor igniter (B, fig. 10-9).

(3) Remove the shorting connector (fig. 10-9) from the rocket motor igniter connector, and connect the rocket motor igniter cable assembly connector to the rocket motor igniter connector.

(4) Rerarm the missile, using applicable procedures in chapter 10.

12-102. Replacement of the Rocket Motor Cluster Fin Assemblies

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the eight hexagon-head bolts (fig. 9-23) and flat washers that secure the rocket motor cluster fin assembly to the rocket motor cluster.

b. Installation. Position the rocket motor cluster fin assembly (fig. 9-23), and secure in position with the eight hexagon-head bolts and flat wash-

ers. Tighten the bolts to the torque value given in table 15-10.

12-103. Replacement of the Fairing Wedges

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the hexagon nuts (1, fig. 8-14) and flat washers (2) from the hexagon-head bolts (11) through the bottom and top fairing wedges (8 and 3), or remove the hexagon nuts (3, fig. 8-13) and flat washers (2) from the hexagon-head bolts (6) through the two side fairing wedges (5). Remove the bolts.

(3) Remove the hexagon-head bolts (4 and 10, fig. 8-14) and flat washers (5) and (9) or hexagon-head bolts (7, fig. 8-13) and flat washers (8) that secure the side fairing wedge and the bottom fairing wedge to the assembled nozzle fairings (4, fig. 8-13) and the forward nozzle fairings (1).

b. Installation.

NOTE. The fairing wedge in step (1) below pertains to the applicable side fairing wedges (5), the top fairing wedge (3, fig. 8-14), or the bottom fairing wedge (8).

(1) Liberally coat the mating surfaces of the fairing wedges (5, fig. 8-13), or (3 and 8, fig. 8-14), the rocket motors, and the holes in the fairing wedges for the hexagon-head bolt (6, fig. 8-13) with corrosion-preventive compound.

(2) Position the fairing wedge (5) or (3 or 8, fig. 8-14), and secure to the forward nozzle fairings (1, fig. 8-13) with six hexagon-head bolts (7) and flat washers (8).

(3) Secure either side fairing wedge (5) or top fairing wedge (3, fig. 8-14) to the assembled nozzle fairings (4, fig. 8-13) with eight flat washers (8) and hexagon-head bolts (7), or secure the bottom fairing wedge (8, fig. 8-14) to the assembled nozzle fairings (6) with six flat washers (9) and hexagon-head bolts (10).

(4) Position the hexagon-head bolts (6, fig. 8-13) through the two side fairing wedges (5),

or position two hexagon-head bolts (11, fig. 8-14) through the top and bottom fairing wedges (3 and 8). Install flat washers (2, fig. 8-13) or (2, fig. 8-14) and hexagon nuts (3, fig. 8-13) or (1, fig. 8-14).

(4.1) Torque the nuts and bolts to the values given in table 15-10.

(5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-104. Replacement of the Forward Nozzle Fairings

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rocket motor cluster fin assembly over the forward nozzle fairing to be replaced (par. 12-102a).

(3) Remove six hexagon-head bolts (7, fig. 8-13) or (4 or 10, fig. 8-14) that secure the two fairing wedges (5, fig. 8-13), or (3 and 8, fig. 8-14) to the forward nozzle fairings (1, fig. 8-13) to be replaced. Slide the forward nozzle fairing forward to remove.

b. Installation.

(1) Liberally coat the mating surfaces of the forward nozzle fairings (1, fig. 8-13) and the fitting assemblies (fig. 8-12) with corrosion-preventive compound.

(2) Slide the forward nozzle fairing (1, fig. 8-13) rearward under the two fairing wedges (5) or (3 and 8, fig. 8-14). Secure the fairing wedges and the forward nozzle fairings to the fitting assemblies with six flat washers (8, fig. 8-13) and hexagon-head bolts (7).

(2.1) Torque the bolts to the value given in table 15-10.

(3) Install the fin assembly (par. 12-102b).

(4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-105. Replacement of the Nozzle Fairings

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the four fairing wedges (par. 12-103a). Remove the four forward nozzle fairings (par. 12-104a).

(4) Loosen the fillister-head screws (7, fig. 8-11) in the band clamps (8) that secure the four nozzle fairings (1, 2, 6, and 9) together.

NOTE. Make certain the filler blocks (1, fig. 8-12) are taped in place before completely removing the assembled nozzle fairings.

(5) Slide the assembled nozzle fairings from the rear of the rocket motor cluster.

(6) Remove six fillister-head screws (7, fig. 8-11) from the band clamps on any one of the four nozzle fairings. To remove the bottom or right nozzle fairings (2 and 6), also remove the hexagon-head bolt (4), flat washers (5), and hexagon nut (3) that secure the fairings together.

b. Installation.

(1) Install the assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *al* through *av*).

(2) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-106. Replacement of the Filler Blocks

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (2) through (4)).

(4) Remove the filler blocks (1, fig. 8-12).

b. Installation.

(1) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(2) Reactivate the missile using applicable procedures in chapters 9 and 10.

12-107. Replacement of the Upper Right or Upper Left Fitting Assembly

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (2) through 4)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Attach the rocket motor hoist beam (18, fig. 8-10) to a hoisting device capable of lifting 6,000 pounds.

(6) Position the rocket motor hoist beam over the rocket motor (19) in position 1 or 2 (10 or 11), and install the hoist slings (17) on the rocket motor. Lift the hoisting device just enough to support the rocket motor.

(7) Remove the hexagon-head bolts (2), flat washers (4), and lockwashers (3) that secure either upper fitting assembly (1) to the rocket motor.

(8) Remove the hexagon nuts (8), flat washers (7), recessed washers (6), and internal-wrenching bolts (5) that secure either upper fitting assembly (9 or 15) to the remaining upper fitting assembly and the lower fitting assembly.

b. Installation.

(1) Liberally coat the mating surfaces of the upper fitting assemblies (2, fig. 8-12) and the rocket motor (19, fig. 8-10) with corrosion-preventive compound.

(2) Install the internal-wrenching bolts (5), recessed washers (6), flat washers (7) and eight hexagon nuts (8) to secure either upper fitting assembly (9 or 15) to the lower fitting assembly (14) and remaining upper fitting assembly. Do not tighten the nuts.

(3) Install the hexagon-head bolts (2, fig. 8-10), lockwashers (3), and flat washers (4) to secure the upper fitting assembly (15) to the rocket motor (19).

(4) Tighten the nuts to the torque value given in table 15-10.

(5) Relieve the tension on the hoisting device. Remove the hoist beam slings from the rocket motor; remove the hoisting device.

(6) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(7) Reactivate the missile using applicable procedures in chapters 9 and 10.

12-108. Replacement of Upper Rocket Motors M5E1

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairing and assembled nozzle fairings (par. 12-103 through 12-105).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Remove the upper fitting assembly (par. 12-107a (5) through (7)).

(6) Remove the six internal-wrenching bolts (2 and 4, fig. 8-9) and recessed washers (3) that secure the rocket motor to the rocket motor thrust ring assembly (6) in position 1 or 2.

(7) Lift the rocket motor clear of the rocket motor cluster truck, and position on the base (7, fig. 8-5) of the shipping and storage box. Contact the proper authority for disposition.

b. Installation.

(1) Prepare to install the rocket motor (par. 8-6*d* through *h*).

(2) Install the upper left fitting assembly and the rocket motor in position 1 (par. 8-6 *ac* through *af*) or the upper right fitting assembly and rocket motor in position 2 (par. 8-6 *x* through *aa*).

(3) Tighten all bolts in (2) above to the torque value given in table 15-10.

(4) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-109. Replacement of the Rocket Motor Thrust Ring Assembly

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings and assembled nozzle fairings (par. 12-105a (3) through (5)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor and position on the base (7, fig. 8-5) of the shipping and storage box or a suitable storage area.

(6) Repeat (5) above for the rocket motor in position 2.

(7) Remove the internal-wrenching bolts (2 and 4, fig. 8-9) and recessed washers (3) that secure the rocket motor thrust ring assembly (6) to the two lower rocket motors, and lift the thrust ring assembly clear of the rocket motors.

b. Installation.

(1) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6 *t* through *ah*).

(2) Install filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(3) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-110. Replacement of the Lower Rocket Motors M5E1

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (3) through (5)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor and position on the base of the shipping and storage box (7, fig. 8-5) or a suitable storage area.

(6) Repeat step (5) above for the rocket motor in position 2.

(7) Remove the rocket motor thrust ring assembly (par. 12-109a (7)).

(8) Remove the hexagon-head bolts (5, fig. 8-8), flat washers (3), and lock washers (4) that secure the rocket motor in position 3 or 4 to the lower fitting assembly (2).

(9) Remove the hexagon-head bolt (3, fig. 8-7) and flat washer (2) that secures the forward slipper assembly (1) to the rocket motor forming ring (9).

(10) Attach the rocket motor hoist beam (4) to a hoisting device capable of lifting 6,000 pounds.

(11) Position the rocket motor hoisting beam over the rocket motor (5) in position 3 or 4 (fig. 8-8), and install the hoist slings on the rocket motor.

(12) Lift the rocket motor clear of the rocket motor cluster truck, and position on the base (7, fig. 8-5) of the shipping and storage box. Contact the proper authorities for disposition.

b. Installation.

(1) Prepare to install the two lower rocket motors (par. 8-6*d* through *j*).

(2) Install the rocket motor in position 3 (par. 8-6*p* through *s*) or in position 4 (par. 8-6*k* through *n*).

(3) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6*t* through *ah*).

- (4) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).
- (5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-111. Replacement of Lower Right or Lower Left Fitting Assembly

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).
- (3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (3) through (5)).
- (4) Remove the two upper filler blocks (1, fig. 8-12).
- (5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor, and position on the base (7, fig. 8-5) of the shipping and storage box or a suitable storage area.
- (6) Repeat step (5) above for the rocket motor in position 2.
- (7) Remove the rocket motor thrust ring assembly (par. 12-109a (7)).
- (8) Remove the hexagon-head bolts (fig. 8-8), flat washers, and lockwashers that secure the rocket motor in position 3 or 4 to the lower fitting assembly.
- (9) Prepare to lift the rocket motor (par. 12-110a (10) and (11)).
- (10) Remove the two hexagon-head screws (9, fig. 8-6) and flat washers (10) that secure either rear retaining rail bar (11) to the rear slipper (12).
- (11) Lift the rocket motor (5, fig. 8-7) clear of the rocket motor cluster truck. Leave the rocket motor suspended.
- (12) Remove the internal-wrenching bolts (5, fig. 8-10), recessed washers (6), flat washers (7), and hexagon nuts (8) that secure the two lower fitting assemblies together, and remove the

fitting assembly.

b. Installation.

- (1) Position either lower fitting assembly on the rocket motor cluster truck, and secure to the other lower fitting assembly with the internal-wrenching bolts (5), recessed washers (6), flat washers (7), and hexagon nuts (8).
- (2) Secure the rear retaining rail bar (11, 8-6) to the rear slipper (12) with two hexagon-head screws (9) and flat washers (10).
- (3) Liberally coat the mating surfaces of the rocket motor (fig. 8-8) that will be installed in position 3 or 4 and the lower fitting assembly with corrosion-preventive compound.
- (4) Position the rocket motor to position 3 or 4 and secure to the lower fitting assembly with eight hexagon-head bolts, flat washers, and lockwashers.
- (5) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6*t* through *ah*).
- (6) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).
- (7) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-112. Replacement of the Rear Retaining Rail Bars

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the hexagon-head screws (9, fig. 8-6) and flat washers (10) that secure either rear retaining rail bar (11) to the rear slipper (12).

b. Installation. Install two hexagon-head screws (9) and flat washers (10) to secure either rear retaining rail bar (11) to the rear slipper (12). Tighten the hexagon-head screws to the torque values given in table 15-10.

12-113. Replacement of the Forward Retaining Rail Bars

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Remove the internal-wrenching or hexagon-head bolt (8, fig. 8-7) and recessed washer (7) that secure either forward retaining rail bar (6) to the forward slipper assembly (1).

b. Installation. Install the internal-wrenching or hexagon-head bolt (8) and recessed washer (7) to secure the forward retaining rail bar (6) to the forward slipper assembly (1). Tighten the bolt to the torque value given in table 15-10.

12-114. Replacement of the Forward Slipper

Note. The procedures in paragraphs *a* and *b* below are typical for removal of the forward slipper from rocket motors in either position 3 or 4 (fig. 8-7).

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Raise the rocket motor cluster clear.
- (3) Remove the hexagon-head bolt (3), and flat washer (2) that secure the forward slipper assembly (1) to the rocket motor forming ring (9).

b. Installation.

- (1) Install the hexagon-head bolt and flat washer to secure the forward slipper assembly to the rocket motor forming ring. Tighten the bolt to the torque value given in table 15-10.
- (3) Reactivate the missile, using applicable procedures in chapters 9 and 10.

12-115. Replacement of the Rocket Motor Igniter Cable Assembly

a. Removal.

Warning: Insure that the rocket motor igniter shorting connector is installed in each rocket motor igniter connector when the rocket motor igniter cable assembly is disconnected.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the truss-head screws (9, 14, and 20, fig. 8-20), flat washers (5, 15, and 19), and hexagon nuts (4, 16, and 18) that secure five clamps (6, 13, and 21) to the bracket (10)

and the rocket motor thrust ring assembly (1).

b. Installation.

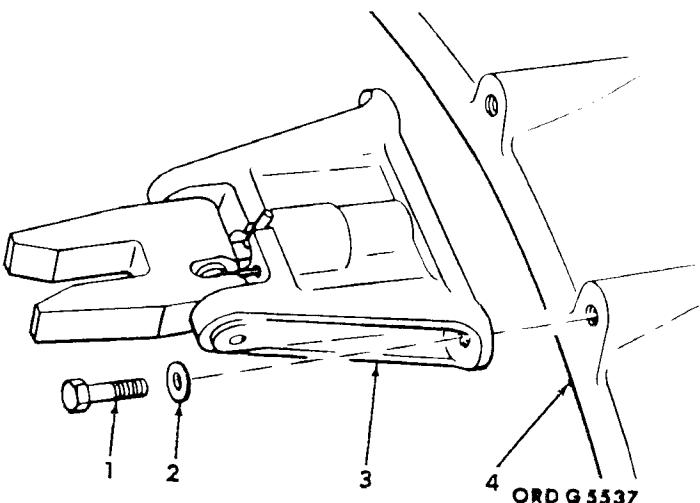
- (1) Check that the shorting connector (fig. 10-7) is inserted in connector P109A at the end of the rocket motor igniter cable assembly.
- (2) Perform the continuity check of the rocket motor igniter cable assembly (par. 8-8).
- (3) Install the rocket motor igniter cable assembly (par. 8-9 *b* through *i*).
- (4) Reactivate the missile, using applicable procedures in chapter 10.

12-116. Replacement of the Elevon Lock

a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the hexagon-head bolts (1, fig. 12-60), and flat washers (2) that secure the elevon lock (3) to the rocket motor thrust ring assembly (4).

b. Installation. Secure the elevon lock to the rocket motor thrust ring assembly with the hexagon-head bolts and flat washers. Tighten the bolts to the torque value given in table 15-10.



1—1/4-20 x 21/32 hex-hd bolt (2)

2—17/64 in-id fl washer (2)

3—Elevon lock (4)

4—Rocket motor thrust ring assembly

Figure 12-60. Removal and installation of the elevon lock.

12-117. Replacement of the Impact Cushion

NOTE. The following procedure is typical for each segment of the impact cushion.

a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the impact cushion (fig. 9-11) from the impact ring.

b. Installation.

(1) Clean both faying surfaces with a clean cloth dampened with toluene, and wipe them immediately with a clean dry cloth. Insure that all old adhesive is removed from the metal surface before rebonding.

(2) Allow the surfaces to air-dry 30 to 60 minutes.

(3) Apply a brush coat of adhesive 9978012 to the faying surfaces.

(4) Allow the adhesive to dry a minimum of 1 hour at 77°F, 2 hours at 33°F, and extend the times for colder ambient temperatures.

(5) Apply a second brush coat of adhesive 9978012 to the faying surfaces, and allow it to dry until it is tacky to the touch, but will not transfer to the finger.

(6) Join the impact cushion (fig. 9-11) to the impact ring firmly.

NOTE. For a stronger or more uniform bond, secure the cushion to the ring with clamps.

(7) Allow the adhesive to dry for 24 hours at 77°F, 48 hours at 50°F, 7 days at 33°F, and extend the times for colder ambient temperatures.

(8) Reactivate the missile, using applicable procedures in chapters 9 and 10.